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"It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease." SIR WM. JONES.



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# JOURNAL

OF THE

## ASIATIC SOCIETY OF BENGAL.

Part I.—HISTORY, LITERATURE, &c.

No. I.—1878.

*The Mo'allagah of Zuheyr rendered into English, with an introduction and notes.—By C. J. LYALL, C. S.*

How war arose between 'Abs and Đubyân from the Race of Dâhis : who fell therein, and who slew them : what famous Days were gained by either kin : what songs were made to tell of valiant deeds done, and what dirges over brave men that died : how the heads of Đubyân were slain at the Cistern of el-Habâ'ah, and how 'Abs wandered forth thereafter through many strange lands : all this may be told at another season. What is now to be related is the manner in which peace was made, and the brother tribes reconciled together.

' There was a certain lord of Đubyân, by name el-Hârith son of 'Auf son of Abû Hârith, of the house of Gheyð son of Murrah son of Sa'd, great in wealth and fame among the kindred of Fezârah. He said one day to his uncle's son, Khârijeh son of Sinân—"Thinkest thou that any whose daughter I asked in marriage would deny her to me?" "Yes," he answered; "Who?" said el-Hârith. "Aus son of Hârith son of La'm of Tayyi'," said Khârijeh. Then said el-Hârith to his servant—"Mount with me." So they mounted one camel together, and rode until they came to Aus son of Hârith in his own land; and they found him in his house. And when he saw el-Hârith son of 'Auf, he said—"Hail to thee, O Hârith:" "And to thee," said el-Hârith. "What has brought thee hither, O Hârith?" said Aus. "I have come a-wooing," answered he. "This is not the place for thee," said Aus, and turned his back upon him and spoke no



word more. Then Aus went in to his wife in anger. Now she was a woman of 'Abs: and she said—"Who was the man who stopped at thy door, with whom thou hadst such short speech?" He answered—"That was el-Hârith son of 'Auf son of Abû Hârith the Murri, the lord of the Arabs." "What befell thee that thou didst not bid him alight?" asked she. "He dealt foolishly with me," said he. "How so?" she asked. "He came a-wooing," he answered. "Dost thou wish to wed thy daughters?" she asked. "Yes," said he. "And if thou wilt not give one to the lord of the Arabs to wife, to whom then wilt thou wed her?" "Nay," he answered, "the thing is done." "Nay but," said she, "make amends for what thou hast done." "How?" he asked. "Follow after him and bring him back with thee." "How should I do so, when that has befallen which has befallen between me and him?" She answered—"Say to him—'Thou foundest me in anger because thou didst propound to me suddenly a matter whereof thou hadst not spoken to me before, and I was not able at the time to answer thee but as thou heardest: but now return, I pray thee, and thou shalt find with me all that thou desirest': verily he will do as thou askest." So Aus mounted and rode after those twain. "Then," (says Khârijeh son of Sinân, who was with el-Hârith and tells the tale,) "By God! I was journeying on our way, when I chanced to raise mine eyes, and saw Aus riding after us. And I went forward to el-Hârith, but he spoke nought to me by reason of the grief that was in him; and I said to him—'Here is Aus son of Hârith following us.' He answered—'And what have we to do with him? pass on.' And when Aus saw that we tarried not for him, he cried after us—'O Hârith! wait for me a moment.' So we waited for him, and he spoke to us that speech which his wife had made for him; and el-Hârith returned with him in gladness. And I heard that Aus when he went into his house said to his wife—'Call to me such an one'—naming the eldest of his three daughters; and she came forth to him. And he said to her—'O my daughter, this is el-Hârith son of 'Auf, a lord of the Arabs: he has come asking a boon, that I should wed to him one of my girls; and I purposed to wed thee to him: what sayest thou thereto?' She answered—'Do it not.' 'Why?' he asked. She said—'I am a woman uncomely in face, faulty in temper: I am not his uncle's daughter, that he should regard my kinship with him, nor is he thy neighbour in the land, that he should be ashamed before thee; and I fear lest one day he see in me something which may displease him, and divorce me, and there befall me therein what is wont to befall.' He said: 'Arise—God bless thee! Call to me such an one'—naming his second daughter: and she called her. And he spoke to her as he had spoken to her sister, and she answered him after the same fashion, saying—'I am ignorant and awkward: there is no skill in my hand. I fear lest he see in me something to



displease him, and divorce me, and there befall me therein what thou knowest. He is not mine uncle's son, that he should regard my right, nor thy neighbour in thy land, that he should be ashamed before thee.' He said: 'Arise—God bless thee! Call to me Buheyseh'—naming his youngest daughter; and she was brought to him. And he spoke to her as he had spoken to her two sisters. And she said—'As thou wilt.' He said—'Verily I offered this to thy two sisters, and they refused.' 'Nay but I,' said she (and he had not told her what the two had said), 'By God! am the fair in face, the skilful with her hands, the noble in nature, the honourable in her father; and if he divorce me, God will bring no good upon him thereafter.' And he said—'God bless thee!' Then he came forth to us and said—'I wed to thee, O Hârith, Buheyseh daughter of Aus.' 'I accept her,' said el-Hârith. Then Aus bade her mother make her ready and deck her for the wedding; and he gave command that a tent should be pitched for el-Hârith, and lodged him therein. And when his daughter was decked out, he sent her in to el-Hârith. And when she was brought in to him, he stayed but a little space, and came forth to me; and I said—'Hast thou prospered?' 'No,' said he. 'How was that?' I asked. He answered—'When I put forth my hand to take her, she said "Stay! doest thou thus before my father and my brethren? No, by God! this is not fitting!"' Then he commanded that the camels should be made ready, and we started on our way, taking her with us. And we journeyed a space; then he said to me—'Go on ahead:' and I went on; and he turned aside with her from the road. And he had tarried but a little when he joined me again; and I said—'Hast thou prospered?' 'No,' he answered. 'Why?' said I. He answered—'She said to me—"Doest thou with me as with a woman-slave that is hawked about for sale, or a captive woman taken in battle? No, by God! until thou slay the camels, and slaughter the sheep, and call the Arabs to the feast, and do all that should be done for the like of me." ' I answered—'By God! I see that she is a woman of a high spirit and understanding; and I hope that she will be to thee a wife who shall bear thee noble sons, if God will.' And we travelled on until we came to our country. And el-Hârith made ready the camels and the sheep, and prepared a feast; then he went in to her. And in a little while he came forth to me, and I asked him—'Hast thou prospered?' 'No,' said he. 'How was that?' I asked. He answered: 'I went in to her and said—"Lo! I have made ready the camels and the sheep as thou seest;" she answered me—"By God! I was told that thou hadst a nobleness which I do not see in thee." "How so?" I asked. She said—"Hast thou a light heart to wed women while the Arabs are slaying one another?" "What wouldst thou have me do?" I asked. She said—"Go forth to these thy kindred, and make peace between them: then return to thy wife, and thou shalt not miss what thou



desirest." "By God!" said I, 'a noble and wise woman! and she has spoken a goodly word!' And he said—'Come forth with me': so we went forth, and came to the two tribes, and walked between them with peace. And the peace was made on the condition that the slain should be reckoned up, and the price of the excess taken from that tribe who had slain more of the other. And we bore the burden of the bloodwits; and they were in all three thousand camels, which were paid in the space of three years. And we returned home with the fairest of fame; and el-Hârith went in to his wife, and she bore him sons and daughters." So said Khârijeh; and these two, Khârijeh and el-Hârith, are the twain whom Zuheyr praises in his song. Such is the testimony of Moḥammed son of 'Abd-el-'Azîz el-Jauharî.

"Now while 'Abs and Ḍubyân were covenanting together for peace, a thing befell that came nigh to setting them at war again. 'Abs had pitched their tents in esh-Sharabbah at a place called Qaṭan, and near them were many tents of Ḍubyân. Now there was a man of Ḍubyân, Ḥoṣeyn son of Ḍamḍam by name, whose father Ḍamḍam had been slain in the war by 'Antarah son of Sheddâd, and his brother Herim by Ward son of Hâbis, both of the house of Ghâlib, of 'Abs; and Ḥoṣeyn swore that he would not wash his head until he had slain Ward or some other man of the line of Ghâlib: but none knew of this oath of his. And el-Hârith son of 'Auf son of Abû Hâritheh and his cousin Khârijeh son of Sinân had already taken upon themselves the burden of the price of blood, and 'Abs and Ḍubyân mixed freely together. And a man of 'Abs, of the house of Makh-zûm, came to the tent of Ḥoṣeyn son of Ḍamḍam and entered therein. "Who art thou, O Man?" said Ḥoṣeyn. "Of 'Abs," said he; and Ḥoṣeyn did not cease to ask his lineage until he found that he was of the house of Ghâlib; and he slew him. And news of this came to el-Hârith son of 'Auf and Herim son of Sinân his cousin, and it was grievous to them. And the news came also to the men of 'Abs, and they mounted and rode in a body towards el-Hârith's tent. And when el-Hârith heard of the anger that was in their hearts, and how they purposed to slay him in requital for the death of their brother, (for Ḥoṣeyn son of Ḍamḍam was also of the line of Murrah, as was el-Hârith son of 'Auf,) he sent to meet them a hundred camels, and with them his son, and said to the messenger—"Say to them—'Are the camels dearer to you, or your own lives?'" And the messenger went forth to meet them, and spoke after this wise. And er-Rabî' son of Ziyâd, who was the leader of 'Abs in that day (—for Qeys son of Zuheyr, their chief in the war, though he counselled the peace, yet took no part therein himself, but withdrew from his kin and went away to 'Omân, where he became a Christian and spent the remainder of his days in prayer and repentance: for he said—"By God! never again can I look



in the face a woman of Ghatafân : for verily I have slain her father or her brother or some other dear to her") —er-Rabi' cried to his following —"O my people! your brother has sent you this message—'Are the camels dearer to you, or will ye rather take my son and slay him in the stead of your slain?' " And they said— "We will take the camels and be reconciled, and conclude our covenant of peace." So peace was made, and el-Hârith and Herim gained the more praise.

\* And Zuheyr made this song to tell of the noble deeds of el-Hârith and Khârijeh, and the rest of the house of Gheyð son of Murrah : for all shared in the peace-making, though the leaders therein were el-Hârith and Khârijeh.

أَمِنْ أُمِّ أَرْفِي دِمْنَةً لَمْ تَكَلَّ      بِحَوْمَانَةِ الدَّرَاجِ وَالْمُتَنَلَّمِ  
وَدَارَ لَهَا بِالرَّقَمَتَيْنِ كَانَهَا      مَرَاجِيعُ وَشَمٍ فِي نَوَاشِرِ مِعْصَمِ  
بِهَا الْعَيْنُ وَالْأَرَامُ يَمْشِينَ خَلْفَةً      وَاطْلَاءُهَا يَنْهَضُنْ مِنْ كُلِّ مَجْدَمِ  
وَقَفْتُ بِهَا مِنْ بَعْدِ عَشْرِينَ حِجَّةً      فَلَيَا عَرَفْتُ الدَّارَ بَعْدَ تَوَهُمِ  
أَتَانِي سُقْعًا فِي مَعْرَسِ مِرْجَلٍ      وَذُرِّيًّا كَجَدِّمِ الْخَوْصِ لَمْ يَنْتَلَمِ  
فَلَمَّا عَرَفْتُ الدَّارَ قُلْتُ لِرَبْعِيهَا      أَلَا أَنْعَمَ صَبَاحًا أَيُّهَا الرَّبْعُ وَاسْلَمِ  
تَبَصَّرَ خَائِلِي هَلْ تَرَى مِنْ طَعَائِنِ      تَحْمَلْنَ بِالْعُلْيَاءِ مِنْ فَوْقِ جُرْثُمِ  
عَلَوْنَ بِأَنْمَاطِ عِتَاقٍ وَكَلَّةٍ      وَرَادَ حَوَاشِدَهَا مُشَاكِبَةُ الدَّمِ  
وَوَرَكْنَ فِي السُّوْبَانِ يعلَوْنَ مَنَّهُ      عَلَيْنَ دَلُّ الذَّاعِمِ الْمُتَنَعِّمِ  
بَكُورًا وَاسْتَحَرْنَ بِسُحْرَةٍ      فَهِنَّ لِيَوَادِي الرِّسِّ كَالْيَدِ لِلْقَمِ  
وَفِيهِنَّ مَلْهُىً لِلطِّيفِ وَمَنْظَرٍ      أَنْيَقُ لِعَيْنِ النَّظِيرِ الْمُتَوَسِّمِ  
كَانَ فُتَاتَ الْعَيْنِ فِي كُلِّ مَنْزِلٍ      نَزَلْنَ بِهِ حَبُّ الْفَنَاءِ لَمْ يَحْطَمِ  
فَلَمَّا وَرَدَنَّ الْمَاءَ زُرْقًا جَمَامُهُ      وَضَعْنَ عَصِيَّ الْحَاضِرِ الْمُتَخَيِّمِ  
جَعَلْنَ الْقَدَانِ مَنْ يَمِينٍ وَحَزَنَهُ      وَكَمْ بِالْقَدَانِ مِنْ مُحِلٍّ وَمُحَرِّمِ



١٥ ظَهَرْنَ مِنَ السُّرْبَانِ ثُمَّ جَزَعْنَهُ عَلَى كُلِّ قَيْنِي قَشِيبٍ وَمَقَامٍ

فَأَقْسَمْتُ بِالْبَيْتِ الَّذِي طَافَ حَوْلَهُ  
يَمِينًا لَنَعَمَ السَّيِّدَانِ وَجِدْتُمَا  
سَعَى سَاعِيَا غَيْظِ بَنِ مُرَّةٍ بَعْدَمَا  
تَدَارَكْتُمَا عَبَسَا وَذُبْيَانٍ بَعْدَمَا  
٢٠ وَقَدْ قُلْتُمَا إِنْ نُدْرِكِ السَّلَامَ وَاسْعَا  
فَأَصْبَحْتُمَا مِنْهَا عَلَى خَيْرِ مَوْطِنٍ  
عَظِيمَيْنِ فِي عَلِيًّا مَعَدٍّ هَدَيْتُمَا  
تَعْقَى الْكَلُومَ بِالْمُدِينِ فَأَصْبَحَتْ  
يُنْجِمُهَا قَوْمٌ لِقَوْمٍ غَرَامَةٌ  
٢٥ فَأَصْبَحَ يُجْرِي فِيهِمْ مِنْ تِلَادِكُمُ

رَجَالُ بَنُوهُ مِنْ قُرَيْشٍ وَجَرَهُمْ  
عَلَى كُلِّ حَالٍ مِنْ سَحِيلٍ وَمَبَرَمٍ  
تَبَزَّلَ مَا بَيْنَ الْعَشِيرَةِ بِالْأَدَمِ  
تَفَانُوا وَدَقُّوا بَيْنَهُمْ عِطْرَ مَدْشَمٍ  
بِمَالٍ وَمَعْرِفٍ مِنَ الْقَوْلِ نَسْلَمُ  
بَعِيدَيْنِ فِيهَا مِنْ عُقُوقٍ وَمَأْتَمٍ  
وَمَنْ يَسْتَبِجُ كَنْزًا مِنَ الْمَجْدِ يَعْظُمُ  
يُنْجِمُهَا مَنْ لَيْسَ فِيهَا بِمُجْرِمٍ  
وَلَمْ يَهْرَيْقُوا بَيْنَهُمْ مِلًّا مُحْجَمٍ  
مَغَانِمُ شَتَّى مِنْ أَفَالٍ مُزَنَّمِ

أَلَا أَبْلَغِ الْأَحْلَافِ عَنِّي رِسَالَةً  
فَلَا تَكْتُمَنَّ اللَّهُ مَا فِي صُدُورِكُمْ  
يُؤَخَّرُ فَيُوضَعُ فِي كِتَابٍ وَيُدْخَرُ  
وَمَا الْحَرْبُ إِلَّا مَا عَلِمْتُمْ وَدَقُّكُمْ  
٣٠ مَتَى تَبْعُدُوهَا تَبْعُدُوهَا ذَمِيمَةٌ  
فَتَعْرُكُكُمْ عَرَكُ الرِّحَى بِثِقَالِهَا  
وَذُبْيَانِ هَلْ أَقْسَمْتُمْ كُلُّ مُقْسَمٍ  
لِيُخْفِيَ وَمَهْمَا يَكْتُمُ اللَّهُ يَعْلَمُ  
لَيَوْمِ الْحِسَابِ أَوْ يُعْجَلُ فَيُنْقَمِ  
وَمَا هُوَ عَنْهَا بِالْحَدِيثِ الْمَرْجَمِ  
وَتَضْرِي إِذَا ضَرَبْتُمُوهَا فَتَضْرِمُ  
وَتَلْقَحُ كِشَافًا ثُمَّ تَنْتَجِ قَتْلُكُمْ



فَتَنَّتْجَ لَكُمْ غِلْمَانُ أَشَامَ كُلُّهُمْ كَأَحْمَرَ عَادٍ ثُمَّ تَرَضِعُ فَتَقَطِّمِ  
فَتُغْلِلُ لَكُمْ مَا لَا تَغُلُّ لِأَهْلِهَا قُرَى بِالْعِرَاقِ مِنْ قَفِيزٍ وَدِرْهَمِ

لَعَمْرِي لِنَعَمِ الْحَيِّ جَرَّ عَلَيْهِمْ بِمَا لَا يُوَاتِيهِمْ حُصَيْنُ بْنُ ضَمْصَمِ  
وَكَانَ طَوِيَّ كَشْحًا عَلَى مُسْتَكِنَةٍ فَلَا هُوَ أَبْدَاهَا وَلَمْ يَتَقَدَّمِ  
وَقَالَ سَأُقْضِي حَاجَتِي ثُمَّ أَتَقِي عَدُوِّي بِأَلْفٍ مِنْ دَرَانِي مُلْجَمِ  
فَشَدَّ وَلَمْ يُقْزِعْ بِيَدُونَا كَثِيرَةً لَدَى حَيْثُ أَلْقَتْ رَحْلَهَا أَمْ قَشَعَمِ  
لَدَى أَسَدٍ شَاكِي السَّلَاحِ مُقَدَّفِ لَهُ لَبْدٌ أَظْفَارُهُ لَمْ تَقْلَمِ  
جَرِيَّ مَتْنِي يُظْلَمُ يُعَاقَبُ بِظُلْمِهِ سَرِيعًا وَإِنْ لَا يُبَدِّ بِالظُّلْمِ يُظْلَمِ

٣٤ رَعَوْا ظِمَامَهُمْ حَتَّى إِذَا تَمَّ أَرْدَدُوا غِمَارًا تَقَرَّى بِالسَّلَاحِ وَبِالدِّمِ  
فَقَضَوْا مَنَافِيَا بَيْنَهُمْ ثُمَّ أَصْدَرُوا إِلَى كَلَا مُسْتَوْبِلٍ مُتَوَخِّمِ  
لَعَمْرُكَ مَا جَرَتْ عَلَيْهِمْ رِمَاحُهُمْ دَمَ ابْنِ نَهْيِكَ أَوْ قَتِيلِ الْمَثَلَمِ  
وَلَا شَارَكَتْ فِي الْمَوْتِ فِي دَمِ نَوْفَلٍ وَلَا رَهَبٍ مِثْلَهَا وَلَا ابْنِ الْمَخْزَمِ  
فَكَلَّا أَرَاهُمْ أَعْبَحُوا يَعْقِلُونَهُ صَحِيحَاتٍ مَالٍ طَالِعَاتٍ بِمَخْرَمِ  
٣٥ لِحْيٍ حِلَالٍ يَعَصُمُ النَّاسَ أَمْرُهُمْ إِذَا طَرَقَتْ إِحْدَى اللَّيَالِي بِمُعْظَمِ  
كَرَامٍ فَلَا ذُو الضِّغْنِ يُدْرِكُ تَبْلَهُ لَدَيْهِمْ وَلَا الْجَانِي عَلَيْهِمْ بِمُسْلَمِ

سَمِئْتُ تَكَالِيفَ الْحَيَاةِ وَمَنْ يَعِشْ ثَمَانِينَ حَوْلًا لَا أَبَاكَ يَسَامِ



وَأَعْلَمَ مَا فِي الْيَوْمِ وَالْأَمْسِ قَبْلَهُ وَلَكِنِّي عَنْ عِلْمِ مَا فِي غَدٍ عَمِ  
رَأَيْتُ الْمَنَایَا خَبَطَ عَشْرَاءَ مَنْ تَصَبَّ تَمَنَّهُ وَمَنْ تَخَطَّى يَعْمَرُ فَيَعْمَرُ  
وَمَنْ لَا يُصَانِعُ فِي أُمُورٍ كَثِيرَةٍ يَضْرُسُ بِأَنْدَابٍ وَيُوطَأُ بِمَذْسِمِ  
وَمَنْ يَجْعَلِ الْمَعْرُوفَ مِنْ دُونِ عِرْضِهِ يَفِرُّ وَمَنْ لَا يَتَّقِ الشَّئْمَ يَشْتَمِ  
وَمَنْ يَكُ ذَا فَضْلٍ فَيَبْخُلُ بِفَضْلِهِ عَلَى قَوْمِهِ يَسْتَغْنِ عَنْهُ وَيَذْمَمِ  
وَمَنْ يُوفِ لَا يَذْمَمُ وَمَنْ يَهْدِ قَلْبَهُ إِلَى مُطْمَئِنِّ الْبَرِّ لَا يَنْجَمَجِمِ  
وَمَنْ هَابَ أَسْبَابَ الْمَنَایَا يَذْلَنُ وَلَوْ يَرْقُ أَسْبَابَ السَّمَاءِ بِسَلَامِ  
وَمَنْ يَجْعَلِ الْمَعْرُوفَ فِي غَيْرِ أَهْلِهِ يَكُنْ حَمْدُهُ ذِمًّا عَلَيْهِ وَيَقْدَمِ  
وَمَنْ يَعْصِ أَطْرَافَ الزَّجَاجِ فَإِنَّهُ يَطِيعُ الْعَوَالِي رُكِبَتْ كُلُّ لَهْذَمِ  
وَمَنْ لَا يَذُدُّ عَنْ حَوْضِهِ بِسِلَاحِهِ يَهْدَمُ وَمَنْ لَا يَظْلِمُ النَّاسَ يَظْلَمُ  
وَمَنْ يَغْتَرِبُ يَحْسَبُ عَدُوًّا صَدِيقَهُ وَمَنْ لَا يُكْرِمُ نَفْسَهُ لَا يَكْرِمُ  
وَمَنْ لَمْ يَزَلْ يَسْتَرْحِلُ النَّاسَ نَفْسَهُ وَلَا يُعْفِيهَا يَوْمًا مِنَ الذَّلِّ يَنْدَمِ  
وَمَهْمَا تَكُنْ عِنْدَ امْرِئٍ مِنْ خَلِيقَةٍ وَإِنْ خَالَهَا تَخْفِي عَلَى النَّاسِ تَعْلَمِ  
وَكَاثِنٌ تَرَى مِنْ صَامِتٍ لَكَ مُعْجِبِ زِيَادَتُهُ أَوْ نَقْصُهُ فِي التَّكَلُّمِ  
لِسَانُ الْفَتَى نِصْفٌ وَنِصْفُ فَوَادِهِ فَلَمْ يَبْقَ إِلَّا صُورَةُ اللَّحْمِ وَالْدَّمِ  
وَأَنْ سَفَاهَ الشَّيْخِ لَا حِلْمَ بَعْدَهُ وَإِنْ الْفَتَى بَعْدَ السَّفَاهَةِ يَحْلُمُ

سَأَلْنَا فَأَعْطَيْتُمْ وَعَدْنَا وَعُدْتُمْ وَمَنْ أَكْثَرَ التَّسَالِ يَوْمًا سَيُحْرَمِ



## ARGUMENT.

In vv. 1—15 the poet, after the fashion of his fellows, strives to touch the hearts of his hearers and to prepare them to receive kindly what he has to say on his real theme by the mention of women and the deserted pasture-grounds which the tribesmen leave at the end of Spring; Umm Aufà was his wife: she bore him, we learn, many children, who all died young, and one day in an angry mood he divorced her. Afterwards he repented of his deed, and prayed her to return to him, but she would not.

Then he turns to praise the two who made the peace and bore the burden of the price of blood (vv. 16—25). After that he exhorts the two tribes (vv. 26—33) to keep faithfully their pact of peace, and after what they have known of War, to stir her not up again. Then he tells of the deed of Ḥoseyn son of Damdam, how he slew his enemy while the two peoples were making ready the peace (vv. 34—39). Then by a figure he relates how the senseless war broke out afresh, and more blood was spilt; for which again the House of Gheyḏ paid from their herds, though themselves without blame (vv. 40—46).

What follows would seem to be a store of maxims of life and conduct, some of which are wanting in certain recensions of the poem, and all do not appear to be here appropriate; nevertheless many of them seem clearly to touch upon the generous deed of the Peace-makers, and to be meant to praise them and to set them as an example to men. In the last verse he warns those who heard him that though noble men may pay for misdoers once and again, the time will come when the thankless shall find none to bear the burden of his guilt.

## I.

- 1 Are they of Umm Aufà's tents—these black lines that speak no word  
in the stony plain of el-Mutathellem and ed-Darrâj?
- 2 Yea, and the place where her camp stood in er-Raqmatân is now  
like the tracery drawn afresh by the veins of the inner wrist.
- 3 The wild kine roam there large-eyed, and the deer pass to and fro,  
and their younglings rise up to suck from the spots where they lie  
all round.
- 4 I stood there and gazed: since I saw it last twenty years had flown,  
and much I pondered thereon: hard was it to know again—
- 5 The black stones in order laid in the place where the pot was set,  
and the trench like a cistern's root with its sides unbroken still.
- 6 And when I knew it at last for her resting-place, I cried—  
'Good greeting to thee, O House—fair peace in the morn to thee!'
- 7 Look forth, O Friend—canst thou see aught of ladies camel-borne  
that journey along the upland there above Jurthum well?
- 8 Their litters are hung with precious stuffs, and thin veils thereon  
cast loosely, their borders rose, as though they were dyed in blood.
- 9 Sideways they sat as their beasts clomb the ridge of es-Sûbân  
—in them were the sweetness and grace of one nourished in wealth  
and ease.







## III.

- 26 Ho! carry my message true to the tribesmen together leagued  
and Ďubyân—Have ye sworn all that ye took upon you to swear?
- 27 It boots not to hide from God aught evil within your breasts:  
it will not be hid—what men would hold back from God, He knows.
- 28 It may be its meed comes late: in the Book is the wrong set down  
for the Reckoning Day; it may be that vengeance is swift and  
stern.
- 29 And War is not aught but what ye know well and have tasted oft:  
not of her are the tales ye tell a doubtful or idle thing.
- 30 When ye set her on foot, ye start her with words of little praise;  
but the mind for her grows with her growth, till she bursts into  
blazing flame.
- 31 She will grind you as grist of the mill that falls on the skin beneath;  
year by year shall her womb conceive, and the fruit thereof shall
- 32 Yea, boys shall she bear you, all of ill omen, eviller [be twins:  
than Aĥmar of 'Âd: then suckling and weaning shall bring their
- 33 Such harvest of bitter grain shall spring as their lords reap not [gain:  
from acres in el-'Irâq of bushels of corn and gold.

## IV.

- 34 Yea, verily good is the kin, and unmeet the deed of wrong  
Ĥoseyn son of ĎamĎam wrought against them, a murder foul!
- 35 He hid deep within his heart his bloody intent, nor told  
to any his purpose, till the moment to do was come.
- 36 He said—'I will work my will, and then shall there gird me round  
and shield me from those I hate a thousand stout cavalry.'
- 37 So he slew: no alarm he raised where the tents stood peacefully,  
though there in their midst the Vulture-mother had entered in
- 38 To dwell with a lion fierce, a bulwark for men in fight,  
a lion with angry mane upbristled, sharp tooth and claw,
- 39 Fearless: when one him wrongs, he sets him to vengeance straight,  
unfaltering: when no wrong lights on him, 'tis he that wrongs.

## V.

- 40 They pastured their camels athirst, until when the time was ripe  
they drove them to pools all cloven with weapons and plashed with  
blood;



- 41 They led through their midst the Dooms : then they drove them forth  
again  
to the pasture rank and heavy, till their thirst should grow anew.
- 42 But *their* lances—by thy life ! were guilty of none that fell :  
Nehik's son died not by them, nor by them el-Muthellem's slain ;
- 43 Nor had they in Naufal's death part or share, nor by their hand  
did Wahab lie slain, nor by them fell el-Mukhazzem's son.
- 44 Yet for each of those that died did they pay the price of blood—  
good camels unblemished that climb in a row by the upland road
- 45 To where dwells a kin great of heart, whose word is enough to shield  
whom they shelter when peril comes in a night of fierce strife and  
storm ;
- 46 Yea, noble are they ! the seeker of vengeance gains not from them  
the blood of his foe, nor is he that wrongs them left without help.

## VI.

- 47 Aweary am I of life's toil and travail : he who like me  
has seen pass of years fourscore, well may he be sick of life !
- 48 I know what To-day unfolds, what before it was Yesterday ;  
but blind do I stand before the knowledge To-morrow brings.
- 49 I have seen the Dooms trample men as a blind beast at random treads  
—whom they smote, he died : whom they missed, he lived on to  
strengthless eld.
- 50 Who gathers not friends by help in many a case of need  
is torn by the blind beast's teeth, or trodden beneath its foot.
- 51 And he who his honour shields by the doing of kindly deed  
grows richer : who shuts not the mouth of reviling, it lights on him.
- 52 And he who is lord of wealth and is niggardly with his hoard  
alone is he left by his kin : nought have they for him but blame.
- 53 Who keeps faith, no blame he earns : and that man whose heart is led  
to goodness unmixed with guile gains freedom and peace of soul.
- 54 Who trembles before the Dooms, yea, him shall they surely seize,  
albeit he set in his dread a ladder to climb the sky.
- 55 Who spends on unworthy men his kindness with lavish hand,  
no praise does he earn, but blame, and repentance the end thereof.
- 56 Who will not yield to the spears when their feet turn to him in peace  
shall yield to the points thereof, and the long flashing blades of  
steel.
- 57 Who holds not his foe away from his cistern with sword and spear,  
it is broken and spoiled : who uses not roughness, him shall men  
wrong.



- 58 Who seeks far away from his kin for housing, takes foe for friend :  
who honours himself not well, no honour gains he from men.
- 59 Who makes of his soul a beast of burden to bear men's loads,  
nor shields it one day from shame, yea, sorrow shall be his lot.
- 60 Whatso be the shaping of mind that a man is born withal,  
though he think it lies hid from men, it shall surely one day be  
known.
- 61 How many a man seemed goodly to thee while he held his peace,  
whereof thou didst learn the more or less when he turned to
- 62 The tongue is a man's one half, the other his valiant heart : [speech !  
besides these two nought is left but a semblance of flesh and blood.
- 63 If a man be old and a fool, his folly is past all cure :  
but a young man may yet grow wise and cast off his foolishness.

## VII.

- 64 We asked, and ye gave : we asked once more, and ye gave again ;  
but the end of much asking must be that no giving shall follow it.

### NOTES TO THE INTRODUCTION.

<sup>1</sup> This story is taken from the *Aghânî*, ix. pp. 149—150 ; it rests on the following *isnâd* :—el-Hasan ibn 'Alî, who heard it from Moḥammed ibn el-Qâsim ibn Mahraweyh, who heard it from 'Abdallâh ibn Abî Sa'd, who heard it from Moḥammed ibn Ishâq el-Museyyibî, who heard it from Ibrâhîm ibn Moḥammed ibn 'Abd-el-'Azîz ibn 'Omar ibn 'Abd-er-Raḥmân ibn 'Auf, who had it from his father. 'Abd-er-Raḥmân son of 'Auf was one of the first converts to el-Islâm, and must have known well el-Hârith son of 'Auf of Ḍubyân, who in his old age became a Muslim. There is some uncertainty as to the names of those who bore the bloodwit at the peace between 'Abs and Ḍubyân : but the great majority of the authorities recognize el-Hârith as the leader in the peace ; some join with him Khârijeh son of Sinân, his first cousin, and others Khârijeh's brother Herim. That two were foremost in the noble work is apparent from v. 18 of the *Mo'allaqah*, as also that they were of the house of Gheyḏ son of Murrah. If Herim had been one, it seems probable that this glory would have been claimed for him by name by Zuheyr, whose chief patron he was ; but though Herim is praised in a large number of poems by Zuheyr, this particular deed is never claimed for him. It is observable that, while *two* are spoken of in vv. 17—22 of the poem (where the dual number is used throughout), afterwards, when speaking of the second payment made necessary by the murder committed by Ḥoseyn (vv. 42—44), Zuheyr uses the plural, as if many of the family of Gheyḏ had taken part in it.

<sup>2</sup> This tale rests on the authority of the famous Abû 'Obeydeh, and is also in the *Aghânî* (ix. pp. 148-9). It is told in substantially the same terms by et-Tebrizî and Ibn Nubâteh. In el-Meydânî's *Proverbs* (Freytag's edn., ii. pp. 275 *sqq.*) it is said that it was Khârijeh son of Sinân who offered his son and two hundred camels to the men of 'Abs in satisfaction for the murder of the man slain by Ḥoseyn ; and the curious fact is added that of the two hundred camels only one hundred were paid, for el-Islâm came and diminished the amount of the bloodwit to that number. If this were



true, it would be an important datum for fixing the year in which the peace was made; but it is not consistent with the other facts of the history. The date of the peace is fixed by M. Caussin de Perceval, on grounds of great probability, at from 608 to 610 A. D. (*Essai*, ii. p. 499); it was not till the 8th year of the Hijrah (629—639 A. D.) that 'Abs and Ġubyân embraced el-Islâm (*id.* iii, p. 218). According to the 'Iqd el-Ferid of Ibn 'Abd Rabbih, quoted by M. Fresnel (*Journ. Asiatique*, 3me série, iv. p. 20), the two persons whom Zuheyr praises in his Mo'allaqah are 'Auf and Ma'qil, sons of Subey' son of 'Amr, of the line of Tha'lebeh ibn Sa'd. These two did indeed, according to el-Meydânî, make peace between 'Abs and their own tribe of the Benû Tha'lebeh, who at first refused to join the rest of Ġubyân in the engagement; but it is impossible to regard them as the two praised by Zuheyr if v. 18 is genuine, inasmuch as they were not of the line of Gheyḡ son of Murrah.

The name of the man who was slain by Hoṣeyn son of Ḍamḍam is given by el-Meydânî and the 'Iqd as Tijân. 'Antarah slew Ḍamḍam, Hoṣeyn's father, on the Day of el-Mureyqib, one of the earliest battles of the war (Fresnel, *loc. cit.* p. 6), and Ward son of Hâbis slew Herim, Hoṣeyn's brother, on the Day of el-Ya'muriyyeh, immediately after the slaying of the hostages by Hoḡeyfeh (Aghânî, xvi. 30). Between these two dates 'Antarah composed his Mo'allaqah, in vv. 73—75 of which he mentions Ḍamḍam as slain by his hand, and the two sons as still alive.

It is worthy of notice that the Mo'allaqah, in vv. 40—46, (if those verses are rightly placed,) seems to tell of a graver dissension as having arisen out of Hoṣeyn's violent deed than that which this tradition relates; for it would appear that the renewal of strife which followed it was the occasion when the slain men named in vv. 42 and 43 (said in the commentary to be all of 'Abs) met their death; and that some bloodshed ensued seems certain from the metaphor in vv. 40—41, where the camels, (that is, the fighting men,) after a *ḡim'*, or period of thirst, are said to have been led down again to drink of the pools of Death. The *ḡim'* was probably the truce during which peace was being arranged.

\* This parenthesis, telling of the end of Qeys son of Zuheyr, is founded on the testimony of Ibn el-Athîr, who is believed generally to follow Abû 'Obeydeh (Kâmil i. p. 434.), and et-Tebrîzî (*Ḥamâseh*, p. 223); it is vouched for by a poem by a man of 'Abs, Bishr son of Ubayy son of Ḥomâm, quoted in the *Ḥamâseh*, where it is said of the horses that ran in the Race of Dâḡis—

جَلَبْنَ بِأَذْنِ اللَّهِ مَقْتَلَ مَالِكٍ      وَطَرَحْنَ قَيْسًا مِنْ دَرَاءِ عُمَانَ

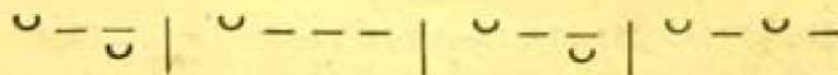
“They brought to pass—so God willed—the spilling of Mâlik's blood,  
and cast Qeys away forlorn an exile in far 'Omân.”

\* This paragraph is mine, and expresses what seems to me the most probable view to take of the case. I should add that besides el-Hârith, Herim, and Khârijeh, another pair of the house of Gheyḡ are mentioned in the 'Iqd (*Journ. Asiat.*, Juillet 1837, p. 18) as having exerted themselves to establish peace between 'Abs and Ġubyân, *viz.* Harmaleh son of el-Ash'ar and his son Hâshim.

#### NOTES TO THE MO'ALLAQAH.

The measure of the poem is the noble cadence called the *Tu'ell*, most loved of all by the ancient poets. Each hemistich consists of four feet, arranged thus—





(In the second foot the third syllable is occasionally, but rarely, short: the only instances of a short third syllable in the 128 hemistichs of this poem are v. 14, *a* and *b*, v. 28, *b*, and v. 33, *b*; it is observable that it most frequently occurs with proper names.)

In the English an attempt has been made to imitate the metre of the original. The measure adopted is not absolutely unknown in our language; it is to be found in many lines of that wonderful organ-swell, Browning's *Abt Vogler*; the seventh stanza of that poem in particular is almost entirely in the *Taell*. The following lines are exactly the Arabic cadence—

"Existent behind all laws, that made them and, lo, they are!"

"And, there! Ye have heard and seen: consider and bow the head!"

Other verses of the same stanza exhibit the licences which I have found it necessary to take with the metre to adapt it to the English; these are chiefly the following:—

- (1.) Dropping the first short syllable, as in v. 10, *b*, 11, *a*.

This is a licence which the Arabs themselves allow, but only (except in a few doubtful instances) at the commencement of a poem. It is matched by Browning's—

"Give it to me to use! I mix it with two in my thought."

- (2.) Addition of a short syllable at the beginning of a foot, as in v. 12, *a*; so in Browning—

"And I know not if, save in this, such gift be allowed to man."

- (3.) Exchanging the one long third syllable of the second foot for two short, as in v. 4, *a* and *b*; so Browning—

"But here is the finger of God, a flash of the Will that can."

- (4.) Changing  $\text{U} \text{ — —}$  into  $\text{U} \text{ U} \text{ —}$  in the third foot, as in v. 9, *a*, v. 11, *b*; compare Browning's—

"That out of three sounds he frame, not a fourth sound, but a Star."

The text above given and translated is that of Arnold (Leipzig, 1850), with two slight amendments in the vocalization of v. 3 *b* and v. 59 *b*, and the substitution of *lau* for *in* in v. 54 *b*; of these the last two are indicated in Arnold's notes, pp. 23 and 24, and the first is adopted from ez-Zauzenî. Arnold's recension agrees in the text and arrangement of the verses with ez-Zauzenî's, except in v. 59, which the latter entirely omits.

Another recension is to be found in Ahlwardt, *Six Poets*, pp. 94 *seq.*; this is based on the MSS. of Gotha and Paris: it differs from Arnold's chiefly in the arrangement of the verses in the *tashbib* describing the journey of the ladies, and in the omission of several of the maxims which follow v. 49 and the arrangement of those which it retains. The following is the order of the verses in Ahlwardt's recension as compared with Arnold's, the numbers of the verses being those of the latter and the arrangement that of the former:—



1—8, (9 omitted) 11, 10, 14—15, 12—13, 18, 16—17, 19—22, 25, 23—24, 26—44 *a*, (after which Ahlwardt inserts a second hemistich which is not in Arnold, and commences the next verse with a first hemistich which is also wanting in the latter. Arnold's 44 *b* agrees with Ahlwardt's 44 *b*;) 45—47, 49, 48, 50, 52, 51, 57, 54, 56, 53, 58, 60, 59. vv. 55 and 61—64 are omitted; they will be found in the Appendix, p. 192.

Of the two main differences above mentioned, it must be admitted that the arrangement of the verses describing the journey reads more smoothly and consecutively in Ahlwardt's text than in Arnold's; perhaps this is rather a reason for suspecting the hand of a later adjuster than for rejecting the more difficult order: in such a matter however no critical judgment is worth much. The second difference, the omission of vv. 55 and 61—64 among the sententious utterances which close the poem, seems to be also generally in favour of Ahlwardt; v. 55 might, as he suggests (*Bemerkungen über die Aechtheit &c.*, p. 64), find its proper place after v. 51. Of the last four verses of Arnold I would retain v. 64, which seems a fitting close of the poem, and appropriate to the tradition (of two payments by the Peace-makers) with which it is connected; the other three are clearly out of place where they stand, and belong to another poem (perhaps two others), whether by Zuheyr or some other poet.

Among the minor differences of arrangement, Ahlwardt's text seems to err in placing v. 18 before vv. 16-17; v. 16 appears clearly to be the opening of the real theme, and the change of person in v. 18 (called *iltifât*) is of frequent occurrence in the old poetry and offers no difficulty. Of the transposition of v. 25 there is little to be said one way or the other. The additions in Ahlwardt after v. 44 *a* are evidently to be rejected, the second inserted hemistich being a mere echo of v. 24 *a*.

Of textual differences there are few of much importance; in v. 11 *a*, Ahlwardt reads *li-ṣ-ṣadiqi* for *li-l-laṭifi*: in v. 14 *b*, *wa man* for *wa kam*: in v. 15 *b*, *mufa'ami* for *wa muf'ami*: in v. 20 *b*, *mina-l'amri* for *mina-l-gauli*: in v. 22 *a*, *wa gheyrihâ* for *hudl-tumâ*: in v. 25 *b*, *ifâli-l-Muzennemi* for *ifâlin muzennemi* (see note below on this verse): in v. 26 *a*, *faman mublighu* for *alâ 'ablighi*: in v. 27 *a*, *tektumenna* (wrongly) for *tektumunna*, and *nufûsikum* for *ṣudûrikum* (last better): in v. 31 *b*, *tahmil* for *tuntej* (last better): in v. 35 *b*, *yetejenjemi* for *yetaqaddemi*: in v. 37 *a*, *tefza' buyûtan kethiretan* for *yufzi' buyûtan kethiretan* (last preferable): in v. 40 *a*, *ra'au mâ ra'au min ḡim'ihim thumma* for *ra'au ḡim'ahum hattâ idâ temma*, and *b*, *tesilu bir-rimâhi* for *tefarrâ bis-silâhi* (last preferable metrically): in v. 43 *a*, *shârakû fi-l-qâumi* for *shâraket fi-l-mauti*: in v. 45 *b*, *ṭala'at* for *ṭaraḡet* (last preferable, since the former unnecessarily repeats the *ṭâli'âtin* of v. 44 *b*): in v. 46 *a*, *ḡu-l-witri yudriku witrâhu* for *ḡu-ḡ-ḡighni yudriku teblâhu*: in v. 54 *a*, *el-meniyyeti yelqahâ* for *el-menâyâ yenehnâhu*, and *b*, *râma* for *yerga*: in v. 53 *a*, *yufḡi* for *yuhda*: in v. 60, *b*, *wa lau* for *wa in*: in v. 59, for our reading Ahlwardt has the following—

*wa man lam yezel yestahmilu-n-nâsa nefṣahu,  
walâ yughnihâ yauman mina-d-dahri, yus'ami:*

in v. 63 *b*, (Appendix p. 192,) *yahlumu* (right: see note below) for *yahlumi*: in v. 64 *b*, *sayohramu* for *sayohrami* (both are equally right grammatically, but the former would be an *iqwâ* if the verse really belongs to this poem).

The verses of the *Mo'allaqah* quoted in the *Aghânî* are the following:—

together on p. 146, Vol. ix, —vv. 1, 3, 4, 6, 56, 54 (in the last verse Ahlwardt's reading, not Arnold's, is given):

on p. 148, v. 18:



on p. 150, vv. 18, 25 (*ifāli-l-Muzennemi*, in accordance with Abū 'Obeydeh's reading), 24 :

on p. 154, v. 60 (with the story of this verse having been quoted by 'Othmān son of 'Affān).

The translation offered is as literal as I have found it possible to make it consistently with English idiom and the rhythm ; where it seemed necessary, I have explained deviations from absolute literalness in the notes : where the change of phrase was slight, I have not thought it needful to notice it. Thus in v. 3, *a*, *khilfetan* is not "to and fro," but "one after another : in v. 32, "Boys shall she bear you, of ill omen, all of them like Aḥmar of 'Ād," is the word-for-word rendering. I have not however consciously anywhere departed from the sense of the original, and but seldom from the phrase. Of other translations, the only ones I have seen are that by M. Caussin de Perceval, at pp. 531—536 of Vol. ii of his *Essai sur l'histoire des Arabes avant l'Islamisme*, and that by Rückert (which omits the *teshīb*) at pp. 147—150 of the first volume of his translation of the *Ḥamāseh* ; the translation by Sir W. Jones, which I believe to be the only one before published in English, I have not been able to consult.

v. 1. El-Mutathellem (according to the Marāsid, el-Mutathellim) is a hill in the high land stretching East of the northern Hījāz, in the country of the Benū Murrah of Ghatafān ; it is mentioned in 'Antarah's Mo'allaqah, v. 4, in connection with el-Ḥazn and eṣ-Ṣammān. Of ed-Darrāj no particular information is given in the Marāsid.

v. 2. "Er-Raqmatān" : according to ez-Zauzenī two places are meant by this name, which is the dual of *er-raqmeh*, a word meaning "the meadow" (*raḡdah*) ; he says that one village called er-Raqmeh is near el-Basrah, and another of the same name near el-Medīneh : they are thus far distant one from another. *Raqmeh* however means, besides a meadow, the side of a valley, or the place in it where water collects ; it seems more probable from the way in which the name is used that one place, not two, is intended ; the same name, in the same dual form, occurs in a lament by a woman of Ghatafān over the death of Mālik son of Bedr given in the Aghānī (xvi, p. 30)—

إِذَا سَجَعْتَ بِالرُّومَيْنِ حَمَامَةً أَوْ الرَّسِّ فَابْكِي فَارِسَ الْكَتَفَانِ

"So long as a turtle means in the groves of er-Raqmatān  
or er-Rass, so long weep thou for him that rode el-Ketefān."

The second hemistich of this verse gives concisely a simile for the water-worn traces of the tents which is found in a more expanded form in Lebid's Mo'allaqah, vv. 8 and 9, q. v. The tattooing over the veins of the inner wrist is said to be renewed, because the torrents have scored deeply certain of the trenches dug round the tents, while others that did not lie in the path of the flood have become only faintly marked, like the veins beneath the tracery.



v. 3. "The wild kine," the *antilope defassa*, a species of bovine antelope. "The deer," *arām* (for *ar'ām*), plural of *ri'm*. *Ri'm* is the white antelope (*antilope leucoryx*); though identical in form with the Hebrew *r'ēm* (*rēym*), it is very doubtful whether the latter word means the same: the LXX translate it by *μονόκερως* (A. V. "unicorn"). The Assyrian is, like the Arabic, *ri'mu*, and there is a good discussion of the meaning of this word in an article on the Animals of the Assyrian Sculptures in the Transactions of the Society of Biblical Archaeology for 1877; it appears certain that it is not the *antilope leucoryx*, but some larger and robuster animal, perhaps the wild buffalo (see Job xxxix, 9-12).

v. 5. "Trench": round the tent a trench is dug to receive the rain from the roof and prevent the water from flooding the interior.

v. 6. "In the morn": the morning was the time when raids were made, and the word *ṣabāḥ* thus itself is used in the sense of a sudden attack. *Yā ṣabāḥāḥ* was the battle-cry (*shī'ār*) of Temīm in the Day of el-Kulāb. To wish peace in the morning to a place is therefore an appropriate greeting.

vv. 7—15. The journey here described would take the wanderers along the southern skirt of the tract called by Palgrave (Cent. and East. Arabia, Vol. I, chap. vi) "the Upper Kaseem;" er-Rass is still a place of some importance, and will be found marked on Palgrave's map some distance to the North of 'Oneyzeh. In the days of Zuheyr the country was in the possession of the Benū Asad, who were not always on the friendliest terms with the Benū Ḍubyān, among whom the poet lived.

v. 12. Tassels of scarlet wool decorated the *ḥaudaj* in which ladies rode. "*Ish-riq* seeds": *ḥabbu-l-fenā*; the exact nature of this plant with a scarlet seed or fruit is very doubtful: see Lane, *s. vv.* عشق and فني

v. 16. "The Holy House" is the Ka'beh. The mention of its building by the Qureysh and the men of Jurhum must not be understood of the same time. Jurhum was the name of two Arab stocks: the first the ancient race who peopled the lower Hijāz and Tihāmeḥ at the time of the legendary settlement of Ishmael among them, with whom he is said to have intermarried; the second (whom M. de Perceval regards as alone having had a historical existence) a tribe who ruled in Mekkeh from about 70 B. C. to 200 A. D. They were expelled from Mekkeh and dispersed so that no memorial of them remained by an Azdite stock from el-Yemen called the Khuzā'ah (C. de Perceval, *Essai*, i, 218. Aghānī, xiii, 108-111.). The second Jurhum are said (Agh. *id.*, p. 109) to have rebuilt the Ka'beh on the foundations laid by Abraham after it had been overthrown by a flood: the architect was one 'Omar el-Jārūd, whose descendants were known as the *Jedarah*, or masons. The Qureysh settled in Mekkeh during its occupation by the Khuzā'ah, and gained possession of the Ka'beh in the time of Quṣayy, whose mother was of the race of the Jedarah, about 440 A. D. (C. de Perceval). Quṣayy, in the year 450 A. D. or thereabout, caused the building erected by the Jurhum to be demolished, and rebuilt the Ka'beh on a grander scale. It was rebuilt a third time in the year 605 A. D., very shortly before the *Mo'allaqah* was composed. Moḥammed, then 35 years old, assisted in the work. These three occasions are probably those to which Zuheyr refers.



"Circle round," *ṭafa ḥaulahu*; the *ṭawāf*, or going round seven times, was one of the most ancient rites of the religion of the Arabs; it was the mode of worship used not only for the Ka'beh, but also for the other objects of reverence among the pagan Arabs: see Lane, s. v. *Duḥār*.

v. 18. In this verse *mā beynā-l-'ashireti* must be understood as meaning the friendship of the two houses of the family. *Beyn* ("that which is between") has two contrary significations: disunion, that which parts or separates, and concord, that which joins; so *Ḍātu-l-beyn* means both enmity and friendship.

*'Ashireh* here means the stock of Baghīd son of Reyth son of Ghatafān, the common father of 'Abs and Ḍubyān; according to the dictionaries *'ashireh* is the smallest sub-division of the tribe, but its use here is clearly opposed to that view. The various words meaning tribe and family are very loosely applied in the old poetry, and the distinctions drawn between them by lexicographers (see Lane s. v. *sha'b*) do not seem to be borne out by usage. In v. 24 'Abs and Ḍubyān are each called *qawm*, and in v. 34 'Abs is a *ḥayy*.

v. 19. The literal translation of this verse is—

"Ye two repaired the condition of 'Abs and Ḍubyān (by peace), after that they had shared one with another in destruction, and had brayed between them the perfume of Menshim."

The second hemistich is said to refer to a custom which existed among the Arabs of plunging their hands into a bowl of perfume as they took an oath together to fight for a cause until the last of them was slain. Menshim, the commentators say, was a woman in Mekkeh who sold perfume. Such an oath was followed by war to the bitter end, and so "he brayed the perfume of Menshim" became a proverb for entering on deadly strife. That oaths so taken were counted of special force may be seen from the tale of "the Oath of the Perfumed ones," *ḥilf el-Muṭayyabin*, taken by the sons of 'Abd-Menāf and their partisans in or about 490 A. D. (see C. de Perceval, *Essai*, i. 254. Ibn-el-Athīr, *Kāmil*, i. pp. 329-30.)

v. 22. Ma'add was the forefather of all those Arabs (generally called *musta'ribah* or insidious) who traced their descent from 'Adnān, whose son he was. The name is thus used to denote the Central stocks, settled for the most part in Nejd and el-Hijāz, as opposed to the Arabs of el-Yemen or of Yemenic origin by whom they were bordered on the North and South. The name of Ma'add's son Nizār is also used in the same way. Nizār was the father of Muḍar, Rabi'ah, and Anmār; the last-named and his descendants joined themselves to the people of el-Yemen; and "Rabi'ah and Muḍar" is again a comprehensive term used to designate the tribes of Nejd and the Hijāz.

v. 25. "Slit-eared, of goodly breed": *min 'ifālīn muzennemi*. There are two ways of taking this phrase: the first is that here adopted, whereby *muzennem* is rendered as an adjective attached to *'ifāl*, meaning "slit-eared." Camels of good breed had a slit made in the ear, and the piece of skin thus detached (called *zenemeh*) left to hang down. The ordinary grammatical construction would require the feminine, *muzennemeh*, to agree with *'ifāl*; but the masculine is used by a poetic license. The other, resting on the authority of Abū 'Obeydeh, reads *'ifālī Muzennemi*, "young camels (the offspring) of Muzennem" (or el-Muzennem): Muzennem, he says, being the name of a famous stallion-camel whose breed was much renowned among the Arabs.



It is worth remarking that this line seems to contradict the assertion of et-Tebrîzî, in his commentary on the *Hamâseh*, p. 107, that the young camels (seven or eight months old) called '*ifâl*' (plural of '*afîl*') were not given in payment of bloodwits. Perhaps there was an exception in the case of the better breeds. The passage, however, on which et-Tebrîzî makes this remark does not necessarily bear him out.

v. 26. "Tribesmen together leagued," *el-Ahlâf*, plural of *hilf*. The commentary says that these confederates were Ghatafân, Asad and Tayyi'; other authorities quoted by Lane (*s. v. hilf*) restrict the appellation to Asad and Ghatafân, Asad and Tayyi', or Fezârah (a branch of Dûbyân) and Asad. Since Dûbyân, a division of Ghatafân, is named separately from the *Ahlâf*, it would seem probable that the word here means only Asad and Tayyi'. I do not, however, find that these confederates took any part in the War of Dâhis, except at the battle of Shi'b Jebileh, when Asad joined Dûbyân and Temîm against 'Âmir and 'Abs; their presence at the oath-taking between the various branches of Ghatafân would, however, render the engagement more formal and solemn: they were a sort of "Guaranteeing Power."

vv. 27-28. Herr von Kremer (*Culturgeschichte des Orients unter den Chalifen*, Vol. ii., p. 358, note\*) regards these verses as interpolated, and alien from the spirit of the poetry of the Ignorance. He says, moreover, that they are inconsistent with v. 48, which expresses the true feeling of that age, that of the Future no man knows anything. Certainly their spirit is more religious than is usual in the old poetry, and the mention of the Book and the Reckoning Day points to a body of doctrine which we are accustomed to think was first planted among the Arabs by Moḥammed. But it is to be remarked that the passage where the verses come (vv. 26-33) seems thoroughly consecutive and complete in sense: that the same number of verses is given, in the same order, in all the recensions of the poem; and that v. 28 exhibits a very curious construction, easily intelligible indeed, but unlikely to be used in an interpolation: this is the carrying on of the *meẓmûn* imperfect from the apodosis of the conditional sentence in v. 27 *b* into the unconditional proposition of v. 28.

As regards the possibility of such an exhortation being addressed to the tribes settled in the country East of Yethrib and South of the mountains of Tayyi' in 610 A. D., I do not think that it should be hastily rejected. Few subjects are more obscure than the real nature of the religion of the pagan Arabs. It would seem that at the time when the Prophet arose there was extremely little religious faith in the people of any sort: that their old divinities were held by them in much the same estimation as that in which our own forefathers in Norway and Iceland held Odin and Thor when Christianity first overspread the North. But beyond the reverence, such as it was, paid to

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\* His words are—"Das Gedicht, Zohair XVI, wird man wegen v. 27 (28), der von der Abrechnung am jüngsten Tage spricht, für unecht oder interpolirt erklären müssen. Ich entscheide mich für das Letztere, denn v. 49 (48) spricht die echte, alte Idee aus, dass man von dem Zukünftigen nichts wisse." In the same note, H. von Kremer sees traces of Mohammedan recension in the name 'Abd-allâh in a poem of 'Antarah's. I presume that he considers the occurrence of that name as belonging to the father of Moḥammed, the son of Jud'ân, and the brother of Dureyd son of eṣ-Ṣimneh, as well as to the tribe-fathers 'Abd-allâh ibn el-Azd (*Ma'ârif*, p. 54), 'Abd-allâh ibn Ghatafân (*id.* p. 39), and 'Abd-allâh ibn Ka'b and 'Abd-allâh ibn Kilâb, sub-divisions of 'Âmir ibn Ṣa'sa'ah (*id.* pp. 42 and 43), to be insufficiently vouched for.



el-Lât, el-'Ozzâ, Menât, Fuls, Wedd, and the rest, there was certainly a back-ground of faith in *The God, Allah*, whose name was, as it still is, in the mouth of every Bedawî as his most frequent ejaculation. Without assuming such a faith as already well known to the people, a great portion of the Qur'ân would be impossible: that revelation is addressed to men who join other gods with God, not those who deny Him. Some tribes may have had more of this belief in the One God, and been accustomed to look more immediately to Him, others (especially those who, like the Qureysh, possessed famous shrines of idolatrous worship which brought them in much profit,) less: probably contact with Judaism and Christianity determined in some measure the greater or less degree of it. Now among the neighbours of the tribes of Ghatafân were the Jews settled from Yethrib to Kheybar and Teymâ; to the North was Kelb in the Daumat (or Dûmat) el-Jendel, almost entirely Christian; Christianity had made some progress in Tayyî', nearer still; and we have seen how, according to a fairly vouched for story, Qeys son of Zuheyr, the chief of 'Abs, spent the last years of his life as a Christian anchorite in 'Omân. To the West was Yethrib, in constant relations with the Kings of Ghassân, who were Christian, together with their people; and to the North-east was el-Hîreh, whose King, en-No'mân Abû Qâbûs, had long been a Christian, and where Christianity had spread among the people long before his day. En-Nâbighah of Dubyân, Zuheyr's famous contemporary, had dwelt long at the Courts both of el-Hîreh and Ghassân; and in a well-known passage\* (much contested, it is true, but in favour of the genuineness of which much may be said,) he refers to a Rabbinical legend of Solomon's power over the Jinn, and how they built for him Tedmur. At the fair of 'Okâṣ Quss son of Sâ'idah had preached Christianity long before Zuheyr made this poem. And to 'Abs itself belonged one of the *Hanifs*, Khâlid son of Sinân son of Gheyth (see Ibn Quteybeh, *Ma'ârif*, p. 30). These things seem to me to make it not impossible that the lines may be genuine. The objection that they are inconsistent with v. 48 appears wholly groundless; the latter refers to the vicissitudes of this world and the chances of life: the former to the reckoning of God in the world after death. (See note on v. 32 for a further argument in favour of the authenticity of these verses.)

v. 29. War, *el-Harb*, is feminine in Arabic; as in vv. 31 and 32 it is personified as a woman, it seemed best to use in the translation the feminine pronoun in vv. 29 and 30.

v. 31. "Skin," *thifâl*, is the mat of skin that is placed beneath the mill to receive the flour. The comparison of War to a mill and the slain to ground grain is common in the old poetry; so says 'Amr son of Kulthûm (*Mo'all.* vv. 30, 31)—

مَتَى تَنْقَلُ إِلَى قَوْمٍ رَحَانَا      يَكُونُوا فِي اللَّقَاءِ لَهَا طَحِينًا  
 يَكُونُ ثِفَالُهَا شَرْقِيَّ نَجْدٍ      وَلَهُتُهَا قُضَاعَةٌ أَجْمَعِينَا

\* En-Nâbighah, v. 22 *sqq.* For a discussion of this passage, see Noeldeke, *Beiträge z. Kenntn. der Poes. d. alt. Araber*, p. XI, and Ahlwardt, *Bemerkungen über die Aechtheit d. alt. Arab. Gedichte*, pp. 17-18 and 41. Noeldeke appears to overlook the tradition (unless he rejects it) that en-No'mân was a Christian.



"When our War-mill is set against a people  
as grain they fall thereunder ground to powder;  
Eastward in Nejd is set the skin beneath it,  
and the grain cast therein is all Quḍā'ah."

"Year by year shall her womb conceive": *telqah kishāfan*; *kishāf* is said of a she-camel that conceives in two following years. Another word used in a like sense of War is *'awān*, which is applied to an animal with a hard hoof (as a cow or mare), that after bringing forth her first-born (*bikr*) conceives again forthwith and bears another young one; so *harbun 'awān* is said of a war the fury of which is perpetually renewed (see *Hamāseh*, p. 180). Again, *hā'il*, plural *hiyāl*, is used of a war which lies long dormant; its meaning is a she-camel that does not conceive for two years, or some years, and it is therefore the opposite of *kishāf*. El-Hārith son of 'Obād said of the War of Basūs after the slaying of his son Bujeyr by Muhelhil—

لَقَحَتْ حَرْبٌ وَائِلٍ عَنْ حِيَالٍ

"The War of Wā'il has conceived at last, having long been barren."

v. 32. "Aḥmar of 'Ād." According to the received story of the Muslims, it was to Thamūd, not to 'Ād, that the prophet Ṣāliḥ was sent to warn them of their wickedness. The sign that he gave them was a gigantic she-camel that issued forth at his bidding from a rock (*Qur'ān* vii. 71): "Then said those among them that were filled with pride—'Verily we reject that in which ye believed.' And they slew the she-camel and rebelled against their Lord, and said—'O Ṣāliḥ! bring upon us that wherewith thou didst threaten us, if thou art indeed of the Sent of God!' Then the earthquake seized them, and they lay on their faces in their dwellings, dead." (*Qur. l. c.* vv. 74—76. The story is also told in *Sūrah* xi, vv. 64—71.) The leader in the slaying of the Camel was Qudār el-Aḥmar, "Qudār the Red"; and thus "More unlucky than Aḥmar of Thamūd," and "More unlucky than the Slayer of the She-camel," became proverbs. The people of Thamūd (—who are mentioned\* by Diodorus Siculus and Ptolemy, and as late as 450 A. D. in the *Notitia dignitatum utriusque imperii*: see C. de Perceval, *Essai* i., p. 27—) dwelt in Hījr, a valley on the road Northwards from the Hījāz into Syria. The race of 'Ād, on the contrary, were settled in the South of Arabia, in the *Ahqāf*, now a vast desert of sand: Ibn Quteybeh (*Ma'ārif*, p. 15) places them "in ed-Daww, and ed-Dahnā, and 'Ālij, and Yebrīn, and Webbār, from 'Omān to Ḥaḍramaut and el-Yemen." To them was sent Hūd (*Qur.* vii. 63 and xi). They were thus separated by the whole distance of Arabia from Thamūd, and, it is probable, also by a vast space of time, if the *Thamudeni* of the *Notitia dignitatum* are the same as the latter people. The commentators give two reasons to explain why Zuheyr said, "Aḥmar of 'Ād" instead of "Aḥmar of Thamūd": the first is the necessity of the rhythm, which would not permit him to say Thamūd; the second is that some of the genealogists say that Thamūd was a cousin of 'Ād, and after the destruction of the

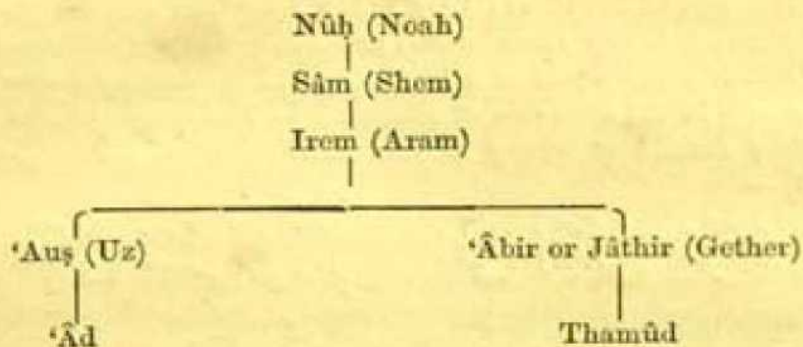
\* In Mr. George Smith's "Assyria" ("Ancient History from the Monuments" Series), p. 100, Sargon, in 715 B. C., is related to have led an expedition into Arabia, "where he conquered the Thamudites and several other tribes, carrying them captive and placing them in the cities of Samaria."



ancient race of 'Ād the people of Thamūd inherited their possessions and were called 'Ād *et-Ākhirch*, "the later 'Ād." The first reason must be rejected, for it would have been easy to the poet so to frame the verse that Thamūd might have been used instead of 'Ād: for instance, he might have said—

*Fatuntej lakum ghilmōna, kullun ka'annahu  
Quddāru Thamūdīn : thumma turqī fateftimi.*

Moreover other poets also speak of Ahmar of 'Âd: *e. g.*, Abû Jundab el-Huḏālî, quoted by et-Tebrizî in the Ḥamâseh, p. 421. The second is more probable, though the Biblical genealogies framed for 'Âd and Thamûd by later Muslim writers can hardly have been known to Zuheyr. According to these, the following was the descent of these two tribes—



A third hypothesis is possible—that some version of the legend of Šalih and his Camel, and the judgment which followed its slaying, was current in the days of Zuheyr which dropped out of mind when el-Islām overspread the land.

If this verse is genuine, it would seem strongly to support the opinion that vv. 27—28 may also be genuine; for it refers plainly to a legend (mentioned in the Qur'ân in a way which shows that it was well known to those addressed) of God's judgment on the wicked. That it is genuine and not a Muslim interpolation appears highly probable from the mention of 'Âd rather than Thamûd: the latter would have been named by a Muslim following the version of the legend embodied in the Qur'ân.

v. 33. "Of bushels of corn and gold," *min qafizin wa dirhemi*: the coinage called *dirhem* was silver, not gold; but the latter is here used (like the word *dirhem* in the original) in the general sense of money. The *qafiz* was a measure of capacity containing eight *mekkúks* or twelve *śá's* of el-'Irâq: one *śá'* of Baghdâd is  $5\frac{1}{2}$  *riṭls*, or pints: the *qafiz* is thus 64 pints. The word is originally Persian, *kawizh* (کویژ).

v. 37. "Though there in their midst the Vulture-mother had entered in," *ledā heythu 'alqet rahlahā 'Ummu qash'ami*: literally, "In that place where the Vulture-mother cast down her camel-saddle." "To cast down one's saddle" (as "to lay down one's staff" in v. 13) means to halt in a place. "The Vulture-mother" is a name of Death, or Calamity; *qash'am* means an old vulture, and is used in that sense in the last verse of 'Antarah's Mo'allaqah.

v. 38. "A bulwark for men in fight," *mugaḥḥaf*: literally, "one whom men cast before them (in battle)," to shield themselves or to do a desperate deed.



v. 40. As explained at the end of the second note to the Introduction, this verse appears to refer to the breaking out again of strife which followed the deed of Ḥoseyn. "They pastured their camels athirst," *ra'au ḡim'ahum*: literally, "They pastured (their camels) for their *ḡim'*, or period between two drinkings." Camels in Arabia are not taken down to drink every day; in the greatest heat they are watered every alternate day: this is called *ghibb*; as the weather gets colder, they pass two days without water, and come down on the fourth: this is called *rib'*; then follow *khims*, *sids*, and so on to *'ishr*, when the *ḡim'* is eight days, and they are watered on the tenth. The camels are the warriors, and the pools the pools of Death. The image seems intended to figure the senselessness of the strife, and its want of object and aim.

v. 41. "Till their thirst should grow anew": these words have been added in the translation to complete the sense; they follow from the description of the pasture (*kela'*) as unwholesome, heavy (*mustaubal*), and indigestible (*mutawakkham*): such, that is, as to stir their thirst again in a short time. The unwholesome pasture is the brooding over wrong in the intervals of combat. In like manner Qeys son of Zuheyr says, of the bitter results of wrong in this same War of Dâḥis (Ḥamâseh, p. 210. Aghânî xvi., 32)—

وَلَكِنَّ الْفَتَى حَمَلٌ بَنَ بَدْرٍ      بَغَى وَالْبَغَى مَرْتَعُهُ رَخِيمٌ

"But the stout warrior Ḥamal son of Bedr  
wrought wrong: and wrong is a surfeiting pasturage."

v. 44. The commentary on this verse seems to me to err in taking *kullan* as equivalent to *kulla wāḥidin minā-l-'āqilin*; it is, I think, equivalent to *kulla wāḥidin minā-l-qatlā*: this follows from the *hu* in *ya'qilūnahu* at the end of the hemistich. I have translated accordingly.

v. 45. This verse contains a difficult word which the dictionaries do not satisfactorily explain, viz. *ḥilāl* in *liḥayyin ḥilālin*. In form it is the plural of *ḥall*, "alighting or abiding in one place"; but it seems always to be used, as here, as an epithet of praise. Lane (s. v. *ḥall*) says that it means "a numerous tribe alighting or abiding in one place." I have not found it in the Ḥamâseh, though *ḥayyun ḥolūlun* (another plural of *ḥall*) occurs in a poem on p. 171; but it is used in a poem by 'Amr son of Kulthūm given in the Aghânî, vol. ix., p. 183—

أَلَا أَبْلَغُ بَنِي جُشَمَ بْنِ بَكْرٍ      وَتَغْلِبَ كُلَّمَا أَتَيْتُمَا حِلَالًا  
بِأَنَّ الْمَاجِدَ الْقَرَمَ بْنَ عَمْرٍو      غَدَاةً نَطَاعٍ قَدْ صَدَقَ الْقِتَالَا

Which seems to mean—

"Ho! carry my message to the sons of Jusham son of Bekr,  
and Teghlib, (that they may know) as often as they come to the great tribe,  
How that the glorious warrior, the son of 'Amr,  
on the morn of Naṭā\* bore himself stoutly in battle."

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\* For the vocalization of Naṭā' here given see the Marâsid, s. v. It is a village of el-Yemâmeh belonging to the Benû Ḥanifeh.



It may possibly mean *numerous*, and hence *strong*, this sense being derived from that of a body of men halting together in a compact host, on the alert and prepared for all attacks.

v. 46. This verse is in praise of 'Abs, and is in continuation of v. 45. The second hemistich offers some difficulty: one does not expect to find their protection of "him that wrongs them" set down to their credit; but the words *el-jāni 'aleyhim* cannot be otherwise rendered. Probably the wronger spoken of is the man who by slaying a member of another tribe involves his own in difficulties. It sometimes happened that such an one found himself unsupported by his kinsmen, and turned out from among them as a *khalī*, or outcast: for instance, el-Hārith son of Ḍālim, who slew Khālid son of Ja'far of 'Āmir while the latter was under the protection of en-No'mān son of el-Munḍir, King of el-Hireh, was so treated by his tribe of Murrah, the same as that to which the men whom Zuheyr praises in this poem belonged. Such a desertion, unless for the gravest possible cause, was held to be disgraceful; and 'Abs are accordingly praised because they would not give up the wrongdoer, though he brought evil upon them.

v. 47. Zuheyr was eighty years old when he composed his Mo'allaqah; if this was in 608 or 610 A. D., as M. de Perceval supposes, he may well have been a hundred, as the Aghānī relates (ix. 148), when he was seen by Mohammed, who said—"O God! grant me a refuge from his Devil!"—that is, his cunning in song; it is added that he made no more poems from that day till his death, which ensued shortly after. This would be about 628 or 630 A. D.; and we know that his son Ka'b gave in his adhesion to the Prophet in 631 (the latter part of the ninth year of the Hijrah), after Zuheyr's other surviving son Bujeyr, together with the greater part of his tribe, the Muzeyneh, had already embraced el-Islām.

v. 49. "Blind beast," *'ashwā*: literally, "a weak-eyed she-camel"—one that sees not well where she is going, and therefore strikes everything with her forefeet, not paying attention to the places where she sets down her feet (Lane). The word is used proverbially: you say—*Rekiba fulānuni-l-'ashwā*, "Such an one rides the weak-eyed she-camel"; that is, he prosecutes his affair without due deliberation; and—*Khabāfa khabāfa-l-'ashwā*, "He trod with the careless tread of a weak-eyed she-camel," he acted at random.

v. 50. If this verse is rightly placed next after v. 49, the rending by the teeth and the treading under foot should refer to the weak-eyed she-camel spoken of in that verse; and so I have taken it, the camel being blind Chance.

v. 53. I am far from satisfied with the translation given of this verse, in which, however, I have scrupulously followed the commentary. The doubtful words are *muṭma'innu-l-birri* and *yetejemjem*; the former is explained as meaning *birrun khālīqun*, that is, "pure goodness"; and the latter as the same as *yetaradded*, that is, "he is disturbed, confounded, perplexed." But Lane renders *muṭma'innu-l-birri* as "quiet, at rest, in heart or mind" (s. v. *birr*, end); for *tejemjema*, he gives—"he spoke indistinctly, he concealed a thing in his bosom, he held back from the thing, not daring to



do it"; the sense of "being disturbed in mind" does not occur, though it may, perhaps, fairly be gathered from the last of those given by Lane. I should be inclined to render *man yuhda qalbuhu*, &c—"He whose heart is guided to quietness and rest of soul is not disturbed in his doings, but acts without fear or trouble of spirit."

v. 56. Among the Arabs, when two parties of men met, if they meant peace, they turned towards each other the iron feet (*zijdj*, plural of *zujj*) of their spears: if they meant war, they turned towards each other the points.

v. 57. The "cistern", *haud*, is a man's home and family.

v. 60. This verse, the commentary tells us, was quoted by 'Othmân son of 'Affân, the third Khalifeh.

v. 62. This accords with the proverb—*innama-l-mar'u bi'azghareyhi*—"A man is accounted of according to his two smallest things"—his heart and his tongue.

vv. 60-62 seem consecutive in sense, and probably belong to the same poem; but it is very difficult to see how they cohere with the rest of this. v. 63, on the other hand, seems separate not only from the rest of the poem, but also from the three verses that precede it; grammar would require that the verb at the end of it should be *marfû'*, not *mejzûm*—*yahlumu*, not *yahlum*: but to read it so would disturb the rhyme, and be a fault of the kind called *iqed*. The commentary says that the *mim* of *yahlum* is originally *mauqûf* (quiescent in a pause), and is read with *kesr*, because that is the appropriate vowel for making a quiescent letter moveable; but this reason is very lame. On the whole, it seems certain that v. 63 does not properly belong to the piece, and it is probable that vv. 60-62 are also intrusions. No other poem of those by Zuheyr that remain has the same metre and rhyme as his *Mo'allaqah*, and it is most likely that fragments of other poems, now lost, in this measure and rhyme that have survived have been included in it, because there was no other piece into which they could be put. The rest of the maxims forming the conclusion of the poem can be understood as arising, some more, some less closely, out of its subject; but the different order in which they occur in different recensions, and the fact that some recensions omit some of them which others supply, make it doubtful whether even they all properly belong to the *Mo'allaqah*.

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*Stray Arians in Tibet.*—By R. B. SHAW, *Political Agent.*

(With one plate.)

The line which divides the Musalmân from the Buddhist populations of Asia, where it crosses the valley of the Upper Indus, passes through the villages of a small tribe which is worthy of some attention. It is Arian in blood though surrounded on all sides but one by Turanians of the Tibetan branch. The people of this tribe are proved by their language and their customs, which are supported by their traditions of former migrations, to



belong to the Dård\* race, although they themselves are not aware of the kinship. They are known simply as *Bròk-pà* (or highlanders). While isolated among strangers they have preserved themselves with a caste-like feeling from amalgamating with them, and seem to have only recently and very superficially accepted the religious beliefs of their neighbours. The greater part of the tribe is thus nominally Buddhist, while two or three of their north-westernmost villages bordering on Baltistán have become Musalmàn.

This tribe presents therefore, to the student of early institutions, the interesting sight of a people of pure Arian race, isolated in the semi-barbarous stage, and who enjoy the rare distinction of being practically unaffected by the action of any of the great philosophising or methodising religions; although in some of their customs they have not altogether escaped being influenced by contact with neighbours of another race.

I paid a visit to the Dàh-Hanu district (the home of these so-called Buddhist Dårds) on my way down to India from Ladàk (Western Tibet) last winter (1876). In a wild gorge through which the narrow Indus rushes, and where the grand masses of granite seemingly piled in confusion on both banks scarce leave room for the passage of the river and conceal the higher mountains behind them, my first camp was pitched. Close by, the Hanu Ravine, which in its upper part expands into a wide inhabited valley, escapes through a rocky chasm into the Indus. Here, on a little triangular plain a few yards in extent between the cliffs and the river, the only flat spot around, the people of Hanu were waiting to receive me. The sun was setting; the gorge was already in deep shade; a line of women in dark attire was drawn up along the side of the pathway, each holding in her hand a saucer full of burning juniper-wood from which columns of smoke ascended in the still air, uniting overhead in a kind of canopy and giving out a pungent incense-like odour. A wild music of drums and screaming pipes was playing. As I approached, the women bent down and placed on the ground at their feet the smoking bowls which screened them as in a cloud, while they greeted me in the peculiar manner of their tribe by waving the two hands rapidly in front of their faces with fingers closed as if holding something.

My attention was chiefly attracted by some witch-like old hags of the number, with faces begrimed by juniper smoke, whose sharp haggard features and deep sunk eyes were in marked contrast with the flat Tibetan countenances to which one is accustomed in Ladàk. These were unmis-

\* Although Dr. Leitner (in his Dardistàn) states that the name Dard was not claimed by any of the race that he met, yet I have heard the Drás people of that tribe apply it to their parent stock in Astor under the form *Dardé*. They are also known to their Kashmíri neighbours by the name of *Dard*, and *Dardu*.



takeably of a different race. They wore long straight woollen smocks, square flat caps poised on their heads with one of the corners projecting over the forehead, the hair done up into numberless slender plaits hanging loose and straight, and sheep skins suspended like cloaks over the shoulders, the only part of their dress resembling that of Tibetan women, excepting the mocassin-like boots. The men were clothed just like Tibetans\* with caps, like black nosebags, falling over one ear.

These people were inhabitants of the Hanu side-valley, whose villages lie some distance up it, but who had come down to the gorge of the main river (Indus) to receive me. They have lost their own tribal dialect and speak Tibetan; but otherwise in dress and customs they resemble the rest of their people.

My next day's march led through similar scenery, the path now rising up the side of the cliff supported on frail-looking scaffoldings of tree-trunks resting on projecting rocks or on wooden trestles, now plunging precipitously down to the river-side where a stone could be thrown to strike the opposite cliff across the Indus. We saw a village or two on the other side at the mouths of lateral valleys, inhabited not by Bròkpàs but by Musalmàn Tibetans from beyond the mountain-range on the west. At length we came to a succession of isolated villages on our own (north-east) side of the river, mostly placed on high alluvial plateaux near the mouths of side ravines (whence they obtain their water for irrigation), and divided by vertical cliffs into terraces rising in successive steps. Here the warmth in summer is great, the rays of the sun being thrown off from the granite sides of the confined valley, so that where water is available the vegetation is luxuriant. Vines trail from the overhanging cliffs and from the splendid walnut trees, and two crops ripen each year on the same ground during the summer season, nothing being grown in winter. The apricots, mulberries, and apples of the district are celebrated. Between the villages there is nothing but the most arid wastes of granite without a green thing to cheer the eye. In this part the villages that occur in the other side of the river are inhabited by Bròkpàs as well as those on this.

*Dàh* is the principal village in this part. Situated on a long sloping alluvial terrace about a hundred yards wide and at the highest part perhaps a couple of hundred feet above the river, it is separated from a still higher terrace by a wall of cliff which culminates in a point immediately above the village. On this point a cairn surmounted by thin staves with fluttering rags attached, marks the supposed abode of a local demon or deity. The howling waste behind, invisible from the village on account of its higher level, but rising into still higher mountain masses which tower above, affords a fitting scene for all the supernatural doings of the

\* Women are everywhere the most conservative of national customs.



mountain spirits. The scenery which inspires awe in a passing traveller, has made its mark on the minds of the inhabitants. These lofty solitudes are, from their earliest years, connected with ideas of dread, which shape themselves into myths. The priest affirms that sometimes in the early dawn while performing the annual worship, he perceives a white indistinct shape hovering over the cairn; and this, he says, is the goddess of the spot revealing herself to her worshipper. The people believe that this demon keeps a special watch over all their actions, and in a country where frequent accidents by flood or fell are almost inevitable, and where a false step or a falling rock may cause death at any time, they put down such disasters to the vengeance of the goddess for the neglect of some of their peculiar customs which they have persuaded themselves are religious duties.

Foremost among their tenets is the abhorrence of the cow. This is an essentially Dàrd peculiarity, though not universal among them. Unlike Hindus they consider that animal's touch contamination, and though they are obliged to use bullocks in ploughing, they scarcely handle them at all. Calves they seem to hold aloof from still more. They use a forked stick to put them to, or remove them from, the mother. They will not drink cow's milk (or touch any of its products in any form); and it is only recently that they have overcome their repugnance to using shoes made of the skin of the animal they so condemn. When asked whether their abstaining from drinking the milk and eating the flesh of cows is due to reverence such as that of the Hindus, they say that their feeling is quite the reverse. The cow is looked upon as bad not good, and if one of them drank its milk, they would not admit him into their houses.

Again in reply to a question, they ascribed this custom to the will of their goddess. They found by experience that she would not allow them to drink the milk of cows with impunity. The son of a certain head-man of the village of Ganok, a Musalmàn Bròkpà, had broken through the prohibition after living some years among the Baltis. After a time the goddess caused him to go mad and to throw himself into the river where he was drowned.

Thus although the Bròkpàs of Dàh-Hanu are nominally Buddhists, yet their real worship is that of local spirits or demons like the *Lhà-mo* (goddess) of Dàh.\*

\* In this, however, they are not singular; for the Tibetans of Ladàk also have a reverence for similar spirits of purely local influence called *Lhà* (cf. *Lhà-sa* "the city of gods"), a reverence which seems to be neither founded on the Buddhist dogmas, nor much countenanced by the more respectable members of the Lāmaïte hierarchy. An annual incarnation of one of these demons (a female) takes place at Shè, a village of Ladàk, in the month of August; but though Lāmas are so plentiful in the country, it is to one of the lay members of a certain family that the honour of giving a temporary body to the deity belongs, while Lāmas are rarely to be seen in the crowds that witness



Her name is *Shiring-mo*.<sup>\*</sup> A certain family in the village supplies the hereditary officiating priest. This person has to purify himself for the annual ceremony by washings and fastings for the space of seven days, during which he sits apart, not even members of his own family being allowed to approach him, although they are compelled during the same period to abstain from onions, salt, chang (a sort of beer), and other unholy food. At the end of this period he goes up alone on to the rocky point before mentioned above the village, and after worshipping in the name of the community the deity who dwells there in a small cairn,<sup>†</sup> he renews the branches of the "*shukpa*" (*Juniperus excelsa*)<sup>‡</sup> which were placed there the previous year, the old branches being carefully stowed away under a rock and covered up with stones.

It is said that this deity or spirit accompanied the ancestor of the priestly family from the original home of the Bròkpàs in Gilgit. Formerly the priest used to be occasionally possessed by the demon and in this state to dance a devil-dance, giving forth inspired oracles at the same time, but these manifestations have ceased for the last twelve or fifteen years. The worship is now simply one of propitiation inspired by fear, the demon seeming to be regarded as an impersonation of the forces of nature adverse to man in this wild mountainous country. Sacrifices of goats (not sheep) are occasionally offered at all seasons below the rock, by the priest only, on behalf of pious donors. They talk of the existence of the demon as a misfortune attaching to their tribe, and do not regard her with any loyalty as a protecting or tutelary deity. In each house the fireplace consists of three upright stones of which the one at the back of the hearth is the largest, 18 inches or 2 feet in height. On this stone they place an offering for the *Lhàmo* from every dish cooked there, before they eat of it. They also place there the first-fruits of the harvest. Such is their household worship.

Besides this spirit-worship, which is their tribal religion, they have a superficial coating of Buddhism. They say that three or four cycles, that is

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the performance and consult the oracle. Perhaps this may be the remains of a form of local spirit worship which may have preceded Buddhism in these countries. I have already treated this subject elsewhere.

\* The affix *mo* is the Tibetan feminine affix, as *bo* is the masculine.

† The *Siáh-pòsh Káfirs* (probably Dàrds) have also a custom of "going once a year to the top of a mountain as a religious exercise and putting a stone on a cairn" (Leitner's *Dàrdistàn*, Vol. I, Part 3, p. 42).

‡ This is also a Tibetan custom with this difference, that each Tibetan householder has a similar sacred bundle of *shukpa* branches and horns of animals on the flat roof of his own house. But these customs are mere survivals (superstitions) among the Tibetans, while they form the religion of the Bròkpàs.



forty or fifty years ago, after a war between Shigar and Ladāk, when their country was occupied by the Ladāk army, the Lāmas converted them. The head Lāma at the monastery of Skirbuchan, further up the river, told me, however, that it was only some twelve or fifteen years ago that the Bròkpàs were converted by Lāmas from his monastery who went on begging tours amongst them. But this may have been a mere revival. At any rate, there is a remarkable absence in the Dāh-Hanu country, of those Buddhist monuments (long stone dikes covered with inscriptions, and tall structures surmounted by obelisks and containing relics, called respectively *Mané* and *Chorten*) which form such a conspicuous feature along the roads and in the villages of Tibet. I saw one or two small *chortens*, evidently newly erected, and in two villages small *gompàs* or hermit-cells (the larger monasteries of Tibet have the same name) inhabited each by a single Lāma, one of whom was a Tibetan and the other, whom they brought forward rather as a curiosity, a real *Bròkpà* Lāma, the only one in existence. These *gompàs* also were quite new.

The Bròkpàs burn their dead like the Ladākis; that is to say in little brick furnaces on the hill-sides. The upper part of the furnace is a short upright cylinder into which the body is crammed in a squatting posture with the head tied well down between the knees, while a fire is lighted in the square base of the furnace. This method is probably adopted as saving fuel in a country where it is so scarce, and where it would be difficult to get logs sufficient for the ordinary mode of Hindu cremation where the body is extended at full length on an open pyre. The corpse is carried to the burning on a kind of sedan-chair raised by poles on men's shoulders. It is placed in the squatting posture in which it is to be burnt, but covered up with flowing coloured sheets so that it might almost be taken for a veiled woman being carried on a journey. Often in Ladāk a broad-brimmed Lāma's hat is placed on its head to secure a blessing for the soul of the defunct.

Mr. Drew, who has given a most interesting short account of these Bròkpàs in his "Jummoo and Kashmir," is, I think, mistaken in supposing that they have no caste, as the other Dāds have. I have heard of at least three caste-like divisions, which we may call those of *priests*, *cultivators*, and *artisans*. The priestly families (called *Lhābdak*, Tib.) form the highest division in each village. Although men of the next caste are allowed to come into their houses, yet it is only on condition of washing their hands and faces before doing so, especially if they have recently been among the Gentiles (Tibetans, &c.), a precaution that does not seem to be considered necessary on other occasions by the Bròkpàs, who are a very dirty people. This next caste which forms the bulk of the people is called *Rūshen*. The younger branches of the priestly families become *Rūshens*, since there can only be one priest or *Lhābdak* in each village.



Besides these there is a lower caste consisting, in the village of Dàh, of only five families. They were originally blacksmiths, it is said, but no longer carry on the ancestral calling. They are called *Rüzmet* (Tib.) or *Gàrgyut*.<sup>\*</sup> Their women are not allowed to approach the cooking-hearths of the higher caste, nor are the *Rüzmet* men, excepting after a purification similar to that of the *Rüşen* on going into the houses of the priests. The higher castes will not eat what is cooked by them.

Reversing the custom of the Hindus in the matter of marriage, the lower caste may take wives from the higher, but not *vice-versâ* (except in the case of the priests who, I gather, can marry *Rüşen* women). Probably as a consequence of this, a married daughter is never allowed to re-enter the house of her parents and may not touch anything belonging to them. After three generations of marriages with the higher caste, the progeny are admitted into it. While at Dàh, I was questioning a party of Bròkpàs, and one of them, an old man who, though sitting rather apart, had been very forward in answering my questions, became silent and hung down his head when I began inquiries into the caste-system. It appeared that he was a *Rüzmet* or low-caste-man. But presently he brightened up and said: "True, I am now a *Rüzmet*, but in three generations I can become *Rüşen*." This thought seemed to console the old man, much to the amusement of the others.

Polyandry is the rule in Dàh-Hanu. As the Bròkpàs do not intermarry with the neighbouring Tibetans, it would seem that the question of its possible cause or effect in a disproportion of the sexes could be well studied in this confined area. I had not leisure or opportunity to obtain exact statistics, but if there were any notable excess of either sex in such small communities, where there is no monasticism to speak of, it could hardly escape notice by the more intelligent among them. I repeatedly put the question: "Why do several brothers take only one wife between them?" The answer given me was: "Because the land is not sufficient to provide food for the families of the several brothers, if they each took a wife." Again I asked: "If an equal number of boys and girls are born in your village, as you say; and each family of two or three (or more) brothers takes only one girl to wife between them, where are the other girls? Do they

\* These castes seem roughly to answer to three out of the four castes prevalent among the main body of the Dàrds: viz., 1st, *Shin*; 2nd, *Yashkun* (these two castes trade, cultivate land, or keep sheep); 3rd, *Kramin* (? derived from *Krum*=work) (are weavers, carpenters, blacksmiths, artisans in fact); 4th, *Dóm* (are musicians and do low drudgery; this caste seems absent from the Dàh-Hanu division of Dàrds). [See Leitner's *Dardistan*, Vol. I, Part 3, p. 48, 2nd note, and Drew's *Jummoo and Kashmir*, p. 426.]



marry into the villages of the neighbouring Tibetans?" They answer, No. "Are there many unmarried women in your villages?" They reply that, on the contrary, they often find it difficult to procure wives. It would seem therefore that there must either be a great defect in the number of births of females, or an equal excess in their deaths while young. I could not hear of female infanticide and do not believe that it is practised, as, if it were, it must be known to the Kashmir officials.

It is not only in marriage that they keep themselves apart from their neighbours. They will not eat with the Tibetan Buddhists or Musalmāns or other outsiders, nor will they allow these to come near their cooking places. The caste prejudice seems to originate on the side of the Bròkpà, for their neighbours often eat in their houses, only separate dishes are given them which are afterwards purified with burning juniper. No Bròkpà will eat in the house or from the dishes of a Tibetan; nor will he eat fish or birds or (of course) cow's flesh. Formerly, if they had been among the Tibetans, they would purify themselves with the smoke of the "shukpa" before entering their own houses again.

The tribe is subdivided into several groups of villages. 1st. Those in the Hanu side valley (whose inhabitants have exchanged their own language for Tibetan, being situated on the main road between Skardo and Ladāk.) 2nd. The Dàh group, consisting of Baldès, Phindur, Byéma, Sani, Dundir, and Dàh villages. 3rd. The Garkhon group, consisting of Garkhon, Dàrchik (large village on west of Indus), Sanàcha (ditto), Urdàs, Gagra (up side-stream on east), and Watsara. These are all the Buddhist villages. The people of each group consider themselves to be one community. The Dàh people reckon from seven ancestors who first colonised their villages and of whom they give the names: *viz.*, *Lalüşo* (from whom the Lhábdaqs or priests spring); *Zoné*, *Dàkré*, *Gochaghé* (these three are the ancestors of the *Rüşen* caste); *Düse*, *Gabüre*, and *Tukshüre* (these are the fathers of the *Rüzmet* caste). The land of Dàh is still divided according to these families, though some of it has changed hands. In this fact we may perhaps see a trace of the early Arian joint family holding, passing into the stage of individual proprietorship. Each man knows his own ancestry (real or imaginary), and each field is known as belonging to the patrimony of one of the seven fathers of the tribe, though it may now be in the hands of a descendant of one of the others. The remaining groups of villages have similar traditions. The Dàh people say that their ancestors, when they first came, lived by hunting, not by agriculture. One of their mighty hunters dropped his bow (called in their language *Dàh*) on the hill-side. It became a water channel which fertilized the fields of what afterwards became a village. One of their Chiefs found certain seeds growing wild which he sowed near the water-course. These seeds proved to be those of wheat



and barley. Thus the village was founded. The story of the bow is probably originated either by the curved course of the water-channel which comes out of a side valley and bends round the hill side to reach the village ; or else by a mere superficial resemblance of sound between the name Dàh (of which the origin had become forgotten) and the name for a bow.

Several of the villages possess a communal dwelling in which every inhabitant of the village has a place. That of Dàh is very curious. It covers a considerable space in the angle between the Indus and a side-stream, protected on two sides by the precipitous declivities of the high alluvial plateau on which it stands and on the third by a wall. It was thus fortified against the raids of the neighbouring Baltis. The interior consists of an intricate maze of passages, some open and some covered in, which may be considered either as the lanes of a tightly packed village, or rather as the passages of a vast single storied house which forms the common dwelling of the whole community, each household having its separate apartment or den. Here the people always live during winter, for warmth or for company. They all, however, have other houses for summer, out in the fields. I could not discover that there was any difference in tenure between the lands adjoining the common dwelling and the outlying fields. The village of *Dàrchik* likewise is cut off from the lower course of the valley by a vertical cliff, the escarpment of the plateau on which it stands. There are only two ways of approach. One high up and away from the river, is guarded by a fortified communal dwelling. The other, near the river, consists of a rugged narrow staircase constructed in the face of the cliff and closed by a gateway at the top. Such precautions were necessary in former days when the men of Baltistán made raids on their neighbours, especially on such as were not Musalmàns, and penetrated even to Ladàk. Now all is peace under the common rule of our Feudatory, the Mahárájá of Kashmír.

So much for the (so-called) Buddhist *Bròkpàs*. But the villages of the same tribe which lie exposed to Musalmàn influences down the Indus on the two roads leading north-west and south-west respectively, have all been converted to Islám. Of the settlements on the former road, that down the Indus, and in side-valleys near it, the village of Ganok is entirely inhabited by Musalmàn *Bròkpàs*, while those of Dangel, Marul, Chùlichan, and Singkarmòn, are inhabited partly by Musalmàn (Shí'ah) *Bròkpàs*, and partly by Baltis (Tibetan Musalmàns) of the same sect. Below this the population is entirely Balti. On the other road, that across a low Pass south-westward to Kargil, the villages of Tsirmo and Làlung are also inhabited partly by Musalmàn *Bròkpàs* and partly by Musalmàn Tibetans from the adjoining district of Purik. These Musalmàn *Bròkpàs* on both roads speak the Dàh dialect, and dress like the Dàh people, and keep apart from the Tibetan Musalmàns both in matter of marriage and in eating.



But they have no caste inequalities amongst them like their non-Musalmàn kinsmen, and generally they do not object to drinking milk, though at Tsirno, there seems to be a relic of the *Bròkpà* prejudice against the cow in the fact that their women do not touch that animal.

A short account of the language of these Upper Indus Dàrds (or Dàh-Hanu *Bròkpàs*, as they are usually called), including both the Buddhist and the Musalmàn sections, is given hereafter.

It is a question how these Arian Dàrds (for Arians and Dàrds they undoubtedly are) reached their present abode. Both above and below them in the valley of the Upper Indus and to the east of them in the parallel valley of the Shayok, the inhabitants are all of Tibetan race. Dàrdistàn proper, or the country of the Dàrds\* (the ancient *Bolor*), is situated far away on the lower course of the Upper Indus, and along that river no vestige of their passage exists and no connecting link with their former home.† But from the country of the Dàrds the Indus makes a wide bend westwards and southwards, and from the concavity of this bend we find a line of Dàrd communities running south at first and then trending off to the east until it almost abuts against the settlements of the Dàh-Hanu *Bròkpàs* on the Upper Indus. These Dàrds are Musalmàn, as are also the main body of the Dàrd race in their own home. The Buddhist *Bròkpàs* of Dàh-Hanu acknowledge no kinship with these people, although they say that their ancestors also came from *Gilid* (Gilgit) and *Brushâl*, that is, from Dàrdistàn proper. There is, however, an unmistakable mutual affinity of language and customs. Mr. Drew,‡ in explanation of the difference of religion, very justly supposes the Dàh-Hanu *Bròkpàs* to "belong to an earlier immigration..... separated from the main mass of their tribe brethren at a time before the Dàrds were converted to Muhammedanism."§ The Dàh-Hanu people, having Buddhists on one side of them, would the more easily receive an outward varnish of that faith, while the later Dàrd settlements to the west of them, surrounded by, and intermingled with, Musalmàn, would

\* See Mr. Drew's excellent Race Map in his "Jummoo and Kashmir." To illustrate the present paper the whole of the lightly shaded region to the south, west and north of Gilgit up to the Muztâgh mountains, should be painted of the same colour as Gilgit, for it is all the home of the Dàrds, though Mr. Drew's plan only permitted him to colour what lies within the Mahārājā of Kashmir's territories.

† The isolated settlements of Dàrds in certain villages of Baltistàn, are apparently of more recent origin and moreover do not bridge the chasm.

‡ Drew's "Jummoo and Kashmir", p. 430.

§ If we are to believe the *Tàrikh-i-Rashîdî*, this had not taken place at the time of its author, Mîrzā Haidar's invasion of Dardistàn, in the first half of the 16th century; and, according to Mr. Drew, "Jummoo and Kashmir", page 429, does not seem to have been very completely effected so lately as 30 years ago.



accept Islâm, even if they did not bring it with them from their home. A non-descript paganism (which was probably the religion of the early Dàrds) does not easily resist the encroachments of one of the great dogmatic religions when thrown into unprotected contact with it.

Did the Dàh-Hanu *Bròkpàs* come by the same route as their later brethren, or did they come, as some of them say, up the valleys of the Indus and Shayok? In the latter case, it would be very strange if a migration of Dàrds, with the whole upper course of the Indus before them, should have stopped and located themselves precisely at that point on its course where a subsequent migration of their kindred, starting from the same point but coming by a different route (latterly at right angles to theirs), happens, some centuries after, to have struck the Indus. It seems more probable that the line of the later migration marks that of the earlier one; and that the ancestors of Dàh-Hanu people took the route viâ Astor, Déosaï, the Dràs river, and Kargil, (a route facilitated by the nature of the country in that direction). Crossing by a low Pass into the Indus Valley, they were there arrested by the more difficult mountains on the east of that river. They probably found this district uninhabited; for though the valley of the Indus, both below and above was, and is, occupied by Tibetan States (Baltistân or Little Tibet, and Ladàk); yet so difficult is the gorge of the Upper Indus in this intermediate portion, that all traffic from Skardo (Baltistân) directed towards Ladàk, is diverted round by the parallel Shayok Valley, only crossing back into that of the Indus by the Hanu Pass, beyond Dàh.

Both the Dàh-Hanu people and the Dàrd communities (above mentioned) settled on or about the Dràs river, are called by their Tibetan neighbours *Bròk-pà* (often pronounced *Dòk-pà* with a disregard to the spelling peculiar to Tibetans and Englishmen). *Bròk* means a "mountain pasture" or "alp". The reference may be to the pastures to which they in summer take their sheep (as do also their Tibetan neighbours however) or to the fact of their having settled on grounds which were formerly pastures. But the term *Bròk-pà*, or Highlander, seems more likely to have been applied (as Mr. Drew suggests) to a tribe seen to arrive across the high mountains and descending into the Indus Valley, than to a people coming up that valley from its lower portion, and who have not, since their arrival, taken to a life in the high mountains in any greater degree than their neighbours.

A few words of notice are required for the Dràs Dàrds of the later immigration just mentioned. Their connection with their parent stock is very close, and betokens a comparatively recent separation. They say that their ancestors came from Darèl; and their settlements extend far up the course of the streams leading down from the uninhabitable plateau of Déosaï, which alone separates them from Dàrdistân proper.



The furthest settlements of these people at the *embouchure* of the Dràs river into the Indus, approach very closely to, without mixing with, those of their unrecognised kinsmen of the Dàh-Hanu Division. I have collected a few of their grammatical rules and have made a very short comparative table of some of the most ordinary words in the two dialects, by which it will be seen that they are really only different forms of the same mode of speech. These later Dàrds, as far as Dràs, are intermingled with Musalmàn Tibetans or Baltis. At Dràs the former are Sunnis in religion while the latter are Shi'ahs, but lower down near the Indus both are Shi'ahs. The Dàrds of the Dràs district keep themselves quite separate, both as regards marriage and eating, from the Baltis with whom they are intermingled in the same villages, and show also some slight traces of that abhorrence of the cow which is so marked among the Dàh-Hanu people, and which is also prevalent in greater or less intensity among many of the other Dàrds in their own home. To carry the linguistic inquiry a little further back, a comparison with Dr. Leitner's account of the *Astori* form of the Dàrd language will show that the speech of the Dràs *Bròkpàs* is almost identical with that of the people of Astor or Hazora who are one of the chief branches of the Dàrd race in Dàrdistàn, only divided by the river Indus from Gilgit. We have therefore a continuous chain of communities leading from Dàrdistàn proper to the settlements on the Upper Indus at Dàh-Hanu. The small gap that does exist in point of language and dress between these latter and the most advanced (geographically) of their brethren, would seem to indicate a lapse of time occurring between two successive migrations. The foremost may be in all probability considered the earlier, and in either case they profess the religion of their environment.

Thus we have here the furthest extension in this particular direction, of an Indo-Arian migration, a kind of side-eddy from the great stream. As when one of our Indian rivers is filled by the melting snows, if a sudden increase of the flood comes down, one may see the waters, dammed up as it were by the too slowly moving masses in front, trickle off to one side in the endeavour to find a speedier exit. But soon, the temporary increase abating or the circumstances of the ground proving unfavourable, this side channel ceases to flow onward and stagnates to a pool, leaving the traces of its abortive course as far back as the point of divergence. So it would seem that long after the successive floods of Indo-Arians had poured over the long water-parting of the Hindu-Kush, the latest or the most easterly wave (the Dàrd one) expanding in its turn after a vast lapse of time, but finding the southward way blocked in front of it by the earlier comers, sent off side-currents to the south-eastward. These were but puny streams, wanting moreover sufficient *vis à tergo* to carry them onwards when they found themselves amid a foreign element and progressing towards a higher



and more barren country, instead of reaching the fertile plains to which a southerly course had formerly led their brethren, the Hindus. Here therefore they remained, wedged in among alien populations, but connected with their starting point by the living trail of their passage.

*Note.*—With reference to the question whether any and what degree of connection exists between the Dàrds and the Ghalehahs of the Upper Oxus (see my paper on the latter in the Asiatic Society Bengal, Journal 1876),—it is curious to see that Mr. Drew from native (Dàrd) information classifies one of the Ghalchah tribes, the Wàkhi (called by him *Wàkhik* or *Gòijàl*) amongst the Dàrds. See Drew's *Jummoo and Kashmir*, p. 457. The termination *k* of the word *Wàkhik* is probably a mere Dàrd affix, (cf. *dostek*, *grestok* for *dost*, *grest*).

Dr. Leitner also (*Dardistan*, Vol. I, Part II, p. 24) says that *Gòjâl* is the name given by the Chilâsis to the people between Hunza and Pamer on the Yarkand road. Now these people are the *Sariqolî* Ghalchahs. He adds "there are also *Gojâls* under a Râjâ of *Gojâl* on the Badakhshân road." These can be no other than the *Wàkhî* Ghalchahs, called by Mr. Drew also *Gòijâl*, and the idea suggests itself that perhaps *Gojâl* may be the Dardu form of the name *Ghalcha* given to the same tribes by their Turki neighbours. It is formed by a mere inversion of the position of the latter two consonants, viz., *l*, and *j* or *ch*: گچال for گلچا or غلچا (as *Nucklow* for *Lucknow*). At any rate we see that there is an affinity asserted by the Dàrds between themselves and the Ghalchahs, those neighbours who seem to be, one the most primitive race of the Indian family and the other the most primitive of the Iranians. This assertion of affinity is, to some extent borne out by a comparison of the dialects (see *Journal of Asiatic Society of Bengal*, for 1876, Paper on the Ghalchah languages).

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*Some Grammatical forms of the Dàrd dialects spoken by the Bròk-pàs of*  
(i) *Dàh-Hanu* and of (ii) *Dràs*.

#### SOUNDS.

There is no broad *â*, like *aw* in *pawn*, as in some neighbouring dialects and languages.

The accented *â* to be pronounced as in *father*; unaccented *a* as in *ordinary*, *oriental*.



The accented *é* as *ey* in *they*, but more *staccato*. Unaccented *e* when final is neutral in sound as in the English word *the* when rapidly pronounced before a consonant; this sound approaches that of unaccented *a*. When not final, it is pronounced as in *then* or *yes*.

Besides the long and short *ò, o* and *ù, u*, there is a double-dotted *ö*, pronounced as in German *schön*, and a double-dotted *ü* as in German *mühe* or French *tu*.

With regard to the consonants; the *dh* represents the English soft *th* of *the, this, &c.*, and not the Hindi aspirated *d'h* (which will be represented with an apostrophe, as *d'h, t'h*). Similarly *gh* is *ġ* (ghain) and not the aspirated Hindi consonant.

*Tch* is the compound used by Mr. Drew, in a short list of Dàh-Hanu words given in his "Jummoo and Kashmir," to represent a *ch* pronounced with the tongue curled back to the roof of the mouth. It stands, as he remarks, to the English *ch* in the same relation that the Hindi palatal *ç* does to the dental *t*, [or that the Wàkhi *sch* does to the English *sh* (see my paper on the Ghalehah Languages in the Journal Asiatic Society of Bengal, for 1876); or that *ř* (see below) does to *r*].

The *ñ* (with a mark over it) is the French nasal *n* which is felt rather as affecting the previous vowel than as a distinct sound. When followed by a vowel however, it acquires something of the sound of *ng* in the word *young*, but never to the extent of allowing any distinct *g* to be heard as in English *younger, hunger*. Thus *moñ* "I" is pronounced exactly like the French *mon* "my." Again *hàñs* "I am" and *byuñs* "I go" would be spelt in French *hanse, biounsse*. But *hàña* (where *ñ* is followed by a vowel) is sounded (as regards the medial consonant) somewhat like the English word *hanger* (not as in *anger*).

The *ř* (with a dot over it) represents the palatal *r* of Hindi, pronounced with the tongue turned back. It approaches the sound of a *d*.

The *ŗ* (with a dot under it) represents a sound intermediate between an *r* and a French *j* or the *z* in "*azure*;" that is, the *ŗ* is not clearly trilled but slurred over; while the tongue is almost in the position for an *r* a stream of air is passed, without vibration of the tip, between it and the palate. Thus in the word *potŗo* "grandson", the sound is intermediate between *potŗo* and *potjo* (as in English we may sometimes hear people pronounce the word "trill" almost like "*chill*").

The *ż* (with a dot underneath) represents the French *j* or the *z* in *azure*. It approaches the last letter in sound.

The *y* is only used as a consonant, as in English "yes," "sawyer", &c., (not as in "by," or "every").



I. *Dàh-Hanu Dialect.*

## THE SUBSTANTIVE.

| Singular.                                                                                 | Plural.                                                                  |
|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| N. <i>éi</i> ..... a ewe<br><i>éi-sa</i> (before Trans.<br>verbs not in Past<br>Tense)    | <i>éia</i> ..... ewes<br><i>éia-sa</i> (before Trans.<br>Verbs &c.)      |
| G. <i>éia</i> ..... of a ewe                                                              | <i>éian</i> ..... of ewes                                                |
| D. <i>éiara</i> ..... to a ewe                                                            | <i>éian-da</i> ..... to ewes                                             |
| Acc. <i>éi-za</i> ..... a ewe                                                             | <i>éian-za</i> ..... ewes                                                |
| Abl. <i>éi-zano</i> ..... from a ewe                                                      | <i>éian-zano</i> ..... from ewes                                         |
| <i>éia-süma</i> ..... with a ewe                                                          | <i>éian-süma</i> ..... with ewes                                         |
| Instr. <i>éi-ya</i> ..... by a ewe                                                        | <i>éian-ya</i> ..... by ewes                                             |
| N. <i>à</i> ..... a she goat<br><i>à-sa</i> (before Trans.<br>Verbs not in Past<br>Tense) | <i>oyo</i> ..... she goats<br><i>oyo-sa</i> (before Trans.<br>Verbs &c.) |
| G. <i>oya</i> or <i>às</i> ..... of a she goat                                            | <i>oyon</i> ..... of she goats                                           |
| D. <i>à-ra</i> ..... to a she goat                                                        | <i>oyon-da</i> ..... to she goats                                        |
| Acc. <i>à-za</i> ..... a she goat                                                         | <i>oyon-za</i> ..... she goats                                           |
| Abl. <i>à-zano</i> ..... from a she goat                                                  | <i>oyon-zano</i> ..... from she goats                                    |
| Instr. <i>à-yé</i> ..... by a she goat                                                    | <i>oyo-yé</i> ..... by she goats                                         |
| N. <i>gót</i> ..... a house<br><i>gót-sa</i> (before Trans.<br>Verbs not in Past<br>T.)   | <i>góti</i> ..... houses<br><i>góti-sa</i> (before Trans.<br>Verbs &c.)  |
| G. <i>gótas</i> ..... of a house                                                          | <i>gótin</i> ..... of houses                                             |
| D. <i>gótàra</i> ..... to a house                                                         | <i>gótin-da</i> ..... to houses                                          |
| Acc. <i>gótà-dze</i> ..... a house                                                        | <i>gotin-dze</i> ..... houses                                            |
| Abl. <i>gótà-yono</i> ..... from a house                                                  | <i>gotin-dono</i> ..... from houses                                      |
| <i>gótas-süma</i> ..... with a house                                                      |                                                                          |
| Instr. <i>gót-ya</i> ..... by a house                                                     | <i>gotin-ya</i> ..... by houses                                          |

And so with *gó* "a cow," Gen. *gós*, and the other cases *gó*; *góló* "a bull," Gen. *gólos*, other cases *góló*; *biü* "a boy," Gen. *biüs*, other cases *biü*. But Genitive of *tchigà* "a woman" is *tchügoya* while the Dat. is *tchügé-ra*, the Acc. *tchigà-zé*, the Abl. *tchügé-yono* and the Instr. *tchigà-ya*. The post-position *süma* "with", governs the Genitive.

The Plural is irregular though generally ending with a vowel for the nominative and by the same vowel followed by *n* (and by the appropriate post-positions, if any) for the oblique cases,



Thus the plural of *biū* "a boy" is *bé* in the nom. and *bén* in the oblique cases; *gót* "a house", in the plural is *goti* and *gotin*; "cattle" (plural) is *gölé* and *gölen*; "women" is *tshügoyu*, obl. *tshügoyun*. *Boda* "fathers", obl. *bodan*; *apshi* "horses", obl. *apshan*.

ADJECTIVES do not seem to change for the gender.

### PRONOUNS.

#### Singular.

#### Plural.

#### 1st Person.

|                                        |         |                                           |         |
|----------------------------------------|---------|-------------------------------------------|---------|
| N. <i>moñ</i> (with intrans. verbs)    |         | <i>bà</i> or <i>beng</i> .....            |         |
| <i>mi-sa</i> } (with transitive verbs  | I       | <i>bà-sa</i> } with transitive            | we      |
| or } in the Present and                |         | or } verbs in the Pre-                    |         |
| <i>ma-sa</i> } Future)                 |         | <i>beng-sa</i> } sent and Future          |         |
|                                        |         | Tenses                                    |         |
| G. <i>mi</i> or <i>miü</i> .....       | my      | <i>assü</i> .....                         | our     |
| D. <i>mà-ra</i> .....                  | to me   | <i>assü-ra</i> .....                      | to us   |
| Acc. <i>moñ-ze</i> (with Present       | me      | <i>assü-za</i> .....                      | us      |
| and Future Tenses)                     |         |                                           |         |
| Abl. <i>mon-yono</i> or <i>mon-deo</i> | from me | <i>assü-yono</i> or <i>assü-deo</i> ..... | from us |
| Instr. <i>mi-ya</i> (with Past         | by me   | <i>bà-ya</i> or <i>beng-ya</i> .....      | by us   |
| Tense of Trans. verbs.)                |         |                                           |         |

#### 2nd Person.

|                                               |           |                                      |          |
|-----------------------------------------------|-----------|--------------------------------------|----------|
| N. <i>tü</i> (with intransitive V.)           | thou      | <i>tsi</i> .....                     | ye       |
| <i>ti-sa</i> or <i>tü-sa</i> (with transitive |           | <i>tsi-sa</i> or <i>tsü-sa</i> (with |          |
| Verbs in Present and Fut.)                    |           | trans. V. in Pres. and               |          |
|                                               |           | Fut.                                 |          |
| G. <i>tiü</i> .....                           | they      | <i>tsi</i> .....                     | your     |
| D. <i>tisà-ra</i> .....                       | to thee   | <i>tsü-ra</i> .....                  | to you   |
| Acc. <i>tu-ze</i> (with Present               | thee      | <i>tsü-ze</i> .....                  | you      |
| and Future Tenses)                            |           |                                      |          |
| Abl. <i>tü-yono</i> .....                     | from thee | <i>tsü-yono</i> .....                | from you |
| Instr. <i>ti-ya</i> (with Past                | by thee   | <i>tsi-ya</i> .....                  | by you   |
| Tense of transitive V.)                       |           |                                      |          |

#### 3rd Person.

|                                               |              |                                      |            |
|-----------------------------------------------|--------------|--------------------------------------|------------|
| N. <i>so</i> (fem. <i>sa</i> ) or <i>p'ho</i> | he (here or  | <i>té</i> or <i>p'hé</i> (with intr. | they (here |
| (with intve. V.)                              |              | V.)                                  |            |
| <i>so-sa</i> (with trans. V.)                 |              | <i>té-sa</i> (with tr. V.)           |            |
| Pres. and Fut.                                | there)       |                                      | or there)  |
| G. <i>tes</i> or <i>p'hos</i>                 | of him (do.) | <i>ten</i> or <i>p'héün</i>          | of them    |
| D. <i>té-ra</i>                               | to him       | <i>ten-da</i> or <i>p'héün-da</i>    | to them    |
| Acc. <i>té-za</i> (with Pres.                 | him          | <i>tén-za</i> or <i>p'héün-za</i>    | them       |
| Tenses)                                       |              |                                      |            |
| Abl. <i>té-yono</i>                           | from him     | <i>tén-</i> or <i>p'héün-yono</i>    | from them  |
| Instr. <i>so-ya</i> (with Past                | by him       | <i>té-</i> or <i>p'hé-ya</i>         | by them    |
| Tense of Trans. V.)                           |              |                                      |            |



## THE VERB.

The Intransitive Verb "to go".

*Byàsti* = (in order) to go.*Byà-su* = about to go.*Byuñto* = in going, *or*, whilst going.*Gyéto* = gone *or* having gone. *Bo* — go (Imperative).

## INDICATIVE MOOD.

## Present Future Tense.

| Singular.                  |                                                                                                                                                         | Plural.                                        |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| 1. <i>moñ</i> or <i>mi</i> | $\left\{ \begin{array}{l} \textit{byuñs} \dots \text{I go (masc.)} \\ \text{or will go} \\ \textit{bínis} \dots \text{I go (fem.)} \end{array} \right.$ | <i>bà byenis</i> ..... we go <i>or</i> will go |
| 2. <i>tü</i>               | $\left\{ \begin{array}{l} \textit{byuña} \dots \text{thou goest} \\ \textit{bínia} \dots \text{do. (fem.)} \end{array} \right.$                         | <i>tsi byeni</i> ..... ye go, &c.              |
| 3.                         | $\left\{ \begin{array}{l} \textit{so byàlla} \dots \text{he goes} \\ \textit{sa bîni} \dots \text{she goes} \end{array} \right.$                        | <i>té byàn</i> ..... they go, &c.              |

## Aorist.

|                         |            |                        |         |
|-------------------------|------------|------------------------|---------|
| 1. <i>moñ byü</i> ..... | I go       | <i>ba byüñ</i> .....   | we go   |
| 2. <i>tü byuñ</i> ..... | thou goest | <i>tsi byeni</i> ..... | ye go   |
| 3. <i>so byuñ</i> ..... | he goes    | <i>té byeni</i> .....  | they go |

## Past Tense.

|               |                                                                                                                                       |                                        |           |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----------|
| 1. <i>moñ</i> | $\left\{ \begin{array}{l} \textit{gös} \dots \text{I went (m.)} \\ \textit{gyís} \dots \text{ditto (fem.)} \end{array} \right.$       | <i>bà gyéüñs</i> .....                 | we went   |
| 2. <i>tü</i>  | $\left\{ \begin{array}{l} \textit{go} \dots \text{thou wentest (m.)} \\ \textit{gyéüa} \dots \text{ditto (fem.)} \end{array} \right.$ | <i>tsi gyé</i> or <i>gyéüi</i> .....   | ye went   |
| 3.            | $\left\{ \begin{array}{l} \textit{so go} \dots \text{he went} \\ \textit{sa gyani} \dots \text{she went} \end{array} \right.$         | <i>té gyéani</i> or <i>gyéün</i> ..... | they went |

## Perfect Tense.

|                                         |                      |                                       |                |
|-----------------------------------------|----------------------|---------------------------------------|----------------|
| 1. <i>mi gyéüs</i> (? <i>gyé-hüs</i> )* | I have (or had) gone | <i>bà gyéüñs</i> (? <i>gyé-hüñs</i> ) | we have gone   |
| 2. <i>tü gyé-àstu</i> .....             | thou hast gone       | <i>tsé gyé-àstin</i> .....            | ye have gone   |
| 3. <i>so gyé-àstu</i> .....             | he has gone          | <i>té gyé-àstin</i> .....             | they have gone |

## Future Tense.

*moñ byüko*..... I will go (the other persons of this tense are the same).

\* See Past Tense of Auxiliary Verb "to be".



## THE DEFECTIVE AUXILIARY "to be".

## Present.

## Past.

|                                                |                                                     |
|------------------------------------------------|-----------------------------------------------------|
| 1. <i>moñ</i> or <i>mi hāñs</i> ..... I am     | <i>moñ hūs</i> ..... I was                          |
| 2. <i>tū</i> or <i>ti hāñs</i> ..... thou art  | <i>tū hūa</i> (near) or <i>àstu</i> (far) thou wast |
| 3. <i>so hāñ</i> ..... he is                   | <i>so hūa</i> or <i>àstu</i> ..... he was           |
| 1. <i>bà</i> or <i>beng hānis</i> ..... we are | <i>bà hūñs</i> ..... we were                        |
| 2. <i>tsi hāni</i> ..... ye are                | <i>tsi hūi</i> or <i>àstin</i> ..... ye were        |
| 3. <i>té hāni</i> ..... they are               | <i>té hūn</i> or <i>àstin</i> ..... they were       |

The TRANSITIVE Verb has some peculiarities about its subjects. In the first place, all Tenses except the Past take the second nominative form of Pronouns, *mà-sa*, *ti-sa*, &c., and they add the particle *sa* to substantives in the nominative. Secondly, the *Past Tense* puts the subject in the Instrumentative case, and the object in the nominative, the verbal inflection agreeing with the latter (not in gender, however, but in person), so as almost to assume a Passive form. But as there is a separate Passive, this Tense may be most nearly compared with the Hindustani Transitive Past *e. g.*, *us-ne ek aurat màri* (Hind.) "he struck a woman"; where the verb is in the feminine to agree with the object "woman". So in the Bròkpà dialect: *Tāshis-ya moñ kutudhōs* "Tashi struck me", lit. "by Tashi I was struck", where "*kutudhōs*" is the Past verb-form agreeing with the 1st person singular. The 1st persons singular and plural (when occurring as objects of the action) have each a particular form of the verb assigned to them, while the remaining persons have a common form.

With this explanation we will proceed to the

## CONJUGATION OF A TRANSITIVE VERB.

*Kutisti* = (in order) to strike, (on account of) striking.

*Kuti-su* = about to strike.

*Kutyūnto* = in striking, or whilst striking.

*Kutedho* = having struck.

## IMPERATIVE.

*Kuti* = strike.

## INDICATIVE MOOD.

## PRESENT FUTURE TENSE.

| Singular.       |                                                                                  | Plural.                                    |
|-----------------|----------------------------------------------------------------------------------|--------------------------------------------|
| 1. <i>mà-sa</i> | <i>kutyūñs</i> I strike (masc.)<br>or will strike<br><i>kutīnis</i> ditto (fem.) | <i>bà-sa kutyenis</i> ..... we strike, &c. |
| 2. <i>tū-sa</i> | <i>kutyūña</i> thou strikest<br>(m.) &c.<br><i>kutīniā</i> ditto (f.)            | <i>tsū-sa kutyeni</i> ..... ye strike, &c. |
| 3.              | <i>so-sa kutyālla</i> he strikes &c.<br><i>sà-sa kutīni</i> she strikes &c.      | <i>té-sa kutyàn</i> ..... they strike, &c. |



## AORIST.

|                                           |                                       |
|-------------------------------------------|---------------------------------------|
| 1. <i>mà-sa kutyü</i> .....I strike       | <i>bà-sa kutyüñ</i> .....we strike    |
| 2. <i>tü-sa kutyüñ</i> .....thou strikest | <i>tsi-sa kutyeni</i> .....ye strike  |
| 3. <i>sò-sa kutyüñ</i> .....he strikes    | <i>té-sa kutyeni</i> .....they strike |

## PAST TENSE.

| Instr.                | Object.    | Verb.                                                 | English.                                            |                              |
|-----------------------|------------|-------------------------------------------------------|-----------------------------------------------------|------------------------------|
| S. 1. <i>mi-ya</i>    | <i>moñ</i> | { <i>kutudhös</i> (masc.)<br><i>kutedhís</i> (fem.) } | I was struck                                        | { by me<br>by thee<br>by him |
| 2. <i>ti-ya</i>       |            |                                                       |                                                     |                              |
| 3. <i>so-ya</i>       |            |                                                       |                                                     |                              |
|                       | <i>bà</i>  | <i>kutedheñs</i>                                      | we were struck                                      |                              |
| Pl. 1. <i>beng-ya</i> | (the rest) | <i>kutet</i>                                          | { thou, he, ye or they<br>—wast, was or were struck | { by us<br>by you<br>by them |
| 2. <i>tsi-ya</i>      |            |                                                       |                                                     |                              |
| 3. <i>teñ-ya</i>      |            |                                                       |                                                     |                              |

## PERFECT TENSE.

## Singular.

## Plural.

|                                                  |                                             |
|--------------------------------------------------|---------------------------------------------|
| 1. <i>mà-sa kutyüs</i> ...I have (or had) struck | <i>bà-sa kutyüñs</i> .....we have struck    |
| 2. <i>tü-sa kuté-àstu</i> thou hast struck       | <i>tsi-sa kuté-àstin</i> ...ye have struck  |
| 3. <i>sò-sa kuté-àstu</i> ...he has struck       | <i>té-sa kuté-àstin</i> ...they have struck |

## FUTURE TENSE.

1. *mà-sa kutiko*.....I will strike (the other persons do not vary from this).

## Future Preterit Tense.

|                                                       |                                                       |
|-------------------------------------------------------|-------------------------------------------------------|
| 1. <i>má-sa kuti-su hüs</i> ... I was about to strike | <i>bà-sa kuti-su hüñs</i> ... we were about to strike |
| 2. <i>tü-sa kuti-su húa</i> ... thou &c.              | <i>tsi-sa kuti-su hui</i> ... ye &c.                  |
| 3. <i>sò-sa kuti-su húa</i> ... he &c.                | <i>té-sa kuti-su hün</i> ... they &c.                 |

## CONDITIONAL MOOD.

1. *mà-sa kutetto* if I strike (the other persons and tenses do not vary from this form).

## PASSIVE.

|                                                    |                                                        |
|----------------------------------------------------|--------------------------------------------------------|
| 1. <i>mi kutellas</i> ... I am or have been struck | <i>beng kutellañs</i> ..... we are or have been struck |
| 2. <i>tü kutella</i> ... thou &c.                  | <i>tsi kutellan</i> ..... ye &c.                       |
| 3. <i>sò kutella</i> ... he &c.                    | <i>té kutellan</i> ..... they &c.                      |

When there is a Dative case with a Transitive Past tense, the verb may agree with it in person as it would with the direct object :



E. g. *Tü-ya tiü apsh màra dötös* = thou gavest thy horse to me.  
Where the verb agrees with the person of the person in the Dative.  
In short when there is both a direct object and a dative, one of which is the 1st person (Singular or Plural), the verb agrees with that person by preference, as

E. g. *So-ya moñ gobà-ra dötös* = He gave me to the head-man.  
and *so-ya mà-ra apsh ek dötös* = He gave a horse to me.

Where the 1st person (whether direct *object* as in the first example, or *dative* as in the second) governs the verb.

But *mi-ya miü apsh tisà-ra det* = I gave my horse to thee.

#### BROKPA VERSION OF THE 1ST STORY IN FORBES' PERSIAN GRAMMAR.

*Aflatun-ra ek müsh-ya shunàt : Tü kishti-à-rü hatuk sar batö,*

Plato-to a man-by it-was-asked: thou ship-to many years satest,  
*tsò-a-rü na-žito yé žit?*

sea-to (wonderful) what was seen?

*Aflatun-ya razit : tsò-a harang mi-ya nà-žito žit*

Plato by it-was-said: of the sea this me-by wonderful was seen  
*moñ tralobo pà-'r nüpàdös.*

I safely side-to arrived.

ANALYSIS: Of the verbs, *shunat* is the Past Tense Transitive answering to the typical *kutet*, with its subject *müsh-ya* in the Instrumentative case. *Batö* is 2nd Person Sing. of the Past tense of an Intransitive verb, thus answering to the form *go* of the specimen verb given above. *Kishti-à-rü* is dative, from *kishti-à* obl. crude form of *kishti* (a foreign word). *Tsò-a* is oblique of *tso* (the Tibetan word for "lake"). *Nà-žito* (lit. "not seen") is negative of Past Participle of following verb (to see); *žit* is Past tense transitive agreeing with its object *yé* "what" (*i. e.*, not taking the termination in—*ös* or *eñs* appropriated to the 1st persons sing. and plural); the instrumentative case of the agent, *tü-ya*, is understood. *Razit* is the same form as *shunàt*, and so is *žit* which follows. *Nüpàdös* seems at first sight abnormal, for "to arrive" is an intransitive verb, and yet it has taken the form peculiar to the Past of *transitive* verbs. But in reality it is quite normal: only the Bròkpà verb means "to cause to arrive" (*P. rasànīdan*). E. g. *mi-ya dàk nüpàt* "I delivered the post" (lit. 'by me the post was caused to arrive'). Thus *moñ..... nüpàdös* of the text, is literally: "I ... was caused to arrive" or, as we should say: "I arrived." The full form would be: *Kishti-ya moñ nüpàdös* (lit. by the ship I was caused to arrive) "the ship caused me to arrive."

But although this Past tense of Transitive Verbs so much resembles a Passive in construction, yet there is as much distinction kept up in the



mind of the speaker between it and the real Passive, as there is for instance in Hindustani between *us-ne aurat màri*, and *aurat màri gai*. The sense is active though the form is passive. In the one case the agent is known and generally mentioned in the Instrumentative case; in the other the agent is not known or mentioned.

## DÁH-HANU LOVE SONG.

*Mi mūshū Skishur ganiya kàskyé skyet-tò*

I young-man (pro. name mountain below if-I-look  
of place)

*Bòs payül ʒi-chuñ; toto huñskyé skyet-tò*

Father's home see makes; and above if-I-look

*Numès payül ʒi-chuñ. ʒü-lo Qodà nasīb tūni té.*

(name of woman) home see-makes. Pray God fate joined make.  
in genitive

"If I look below, from the Skishur mountain,

"My father's home is seen (makes itself seen);

And if I look above,

"Nüme's home is seen. Grant, O God, that  
our destinies may be united!"

ANALYSIS: *Skyet-tò* is the Conditional, answering to *kutet-tò*. *Payül* would seem to be compounded of the Tibetan word *yül* "village" and a prefix *pa*. *ʒi-chuñ* is composed of the verb "to see", plus the 3rd pers. sing. of the aorist of the verb "to do", answering to the typical form *kutyuñ*. *Zu-lö* is the Bròkpà form of the common Tibetan salutation *jù* or *ju-lé*, which is like the Hind. *jī*. *Qodà* (*Khudà*) and *nasīb* are words borrowed from their Musalmàn neighbours, apparently in the absence of any words of the same meaning in their own dialect. *Té* is the Imperative.

II. *Dràs Dialect.*

## THE SUBSTANTIVE.

| Singular.                                                  | Plural.                             |
|------------------------------------------------------------|-------------------------------------|
| N. <i>esh</i> or <i>eʒ</i> ..... a ewe                     | <i>eʒé</i> ..... } ewes             |
| <i>esh-sa</i> (before transitive verbs, not in Past Tense) | <i>eʒé-sa</i> ..... }               |
| G. <i>eʒo</i> ..... of a ewe                               | <i>eʒo</i> ..... of ewes            |
| D. & Loc. <i>eʒu-re</i> ..... to, or at a ewe              | <i>eʒo-re</i> ..... to, or at ewes  |
| Acc. <i>eʒu</i> ..... a ewe                                | <i>eʒo</i> ..... ewes               |
| Abl. <i>eʒu-ʒo</i> ..... from a ewe                        | <i>eʒo-ʒo</i> ..... from ewes       |
| <i>eʒu-séi nàlà</i> ..... with a ewe                       | <i>eʒo-séi nàla</i> ..... with ewes |
| Instr. <i>eʒu</i> (before Trans.) }                        | <i>eʒo-ʒa</i> ..... by ewes         |
| Verbs in Past tense) } by a ewe                            |                                     |



|                                                                                         |                                                |
|-----------------------------------------------------------------------------------------|------------------------------------------------|
| N. <i>ài</i> .....a she-goat<br><i>ài-sa</i> (before Trans.<br>Verbs not in Past Tense) | <i>äie</i> }<br><i>äie-sa</i> } .....she-goats |
| G. <i>äio</i> .....of a she-goat                                                        | <i>äio</i> .....of she-goats                   |
| D. & Loc. <i>äi-re</i> ...to, or at a she-goat                                          | <i>äio-re</i> .....to, or at she-goats         |
| Acc. <i>äi</i> .....a she-goat                                                          | <i>äio</i> .....she-goats                      |
| Abl. <i>äi-žo</i> .....from a she-goat                                                  | <i>äio-žo</i> .....from she-goats              |
| <i>äi-séi nàlà</i> .....with a she-goat                                                 | <i>äio-séi-nàlà</i> .....with she-goats        |
| Instr. <i>äio</i> ... (before... by a she goat<br>Trans. verbs in<br>Past Tense)        | <i>äio-za</i> .....by she goats                |

|                                                                                  |                                               |
|----------------------------------------------------------------------------------|-----------------------------------------------|
| N. <i>gòr</i> .....a house<br><i>gòr-sa</i> (before Tr. v.<br>not in Past Tense) | <i>gòri</i> }<br><i>gòri-sa</i> } .....houses |
| G. <i>gòr-o</i> .....of a house                                                  | <i>gòro</i> .....of houses                    |
| D. & Loc. <i>gòr-re</i> ...to, or at a house<br>(sometimes— <i>ra</i> )          | <i>gòro-ra</i> .....to, or at houses          |
| Acc. <i>gòr</i> or <i>gòr-re</i> a house                                         | <i>gòro</i> or <i>gòro-ra</i> ...houses       |
| Abl. <i>gòr-žo</i> .....from a house<br>(in some- <i>no</i> )                    | <i>gòro-žo</i> .....from houses               |
| Instr. <i>gòr-i</i> .....by a house<br>(before Trans.<br>Verbs in Past Tense)    | <i>gòro-za</i> .....by houses                 |

ADJECTIVES do not seem to change for Gender.

#### PRONOUNS.

|                                                                       |                                                                   |
|-----------------------------------------------------------------------|-------------------------------------------------------------------|
| N. <i>moñ</i> .....I<br><i>moñ-sa</i> (before Tr. V.,<br>not Past T.) | <i>bé</i> .....we<br><i>bé-sa</i> (before Tr. V.,<br>not Past T.) |
| G. <i>mioñ</i> .....of me, my                                         | <i>asso</i> .....of us, our                                       |
| D. }<br>& Loc. } <i>moñ-re</i> .....to, or at me                      | <i>asso-re</i> .....to, or at us                                  |
| Acc. <i>moñ</i> .....me                                               | <i>asso</i> .....us                                               |
| Abl. <i>moñ-žo</i> .....from me                                       | <i>asso-žo</i> .....from us                                       |
| Instr. <i>mi</i> (before Tr. by me<br>Vbs. in Past Tense)             | <i>asso-za</i> .....by us                                         |



|                                      |              |                                        |          |
|--------------------------------------|--------------|----------------------------------------|----------|
| N. <i>tù</i>                         |              | <i>tsó</i> (f. <i>tsà</i> )            |          |
| <i>tú-sa</i> (before Tr.             | } thou       | <i>tsó-sa</i> (before Tr.              | } ye     |
| V. not in Past                       |              | V. not in Past                         |          |
| Tense)                               |              | Tense)                                 |          |
| G. <i>tó</i> (or <i>túin</i> ?)..... | of thee, thy | <i>tsó</i> (or <i>tsòin</i> ?) .....   | of you   |
| D. <i>tù-re</i> .....                | to thee      | <i>tsó-re</i> .....                    | to you   |
| Acc. <i>tú</i> .....                 | thee         | <i>tsó</i> .....                       | you      |
| Abl. <i>tú-zo</i> .....              | from thee    | <i>tsó-zo</i> .....                    | from you |
| <i>túin-séi nála</i> .....           | with thee    | <i>tsó-séi nála</i> .....              | with you |
| Instr. <i>tó</i> .....               | by thee      | <i>tsò-za</i> ( <i>tsá-za</i> f.)..... | by you   |

## Pronouns Substantival and Adjectival.

| Singular.                                                                                               | Plural.                                                                   |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| N. <i>nú</i> or <i>ào</i> or <i>ánu</i> or<br><i>aiñ</i> (fem. <i>ni</i> or <i>á</i> or<br><i>ani</i> ) | <i>ni</i> or <i>ani</i>                                                   |
| <i>núsa</i> or <i>anu-sa</i> (f. <i>ni-sa</i><br>or <i>ani-sa</i> (before Tr.<br>V. not in Past T.))    | <i>ni-sa</i> or <i>ani-sa</i> }<br>(before Tr. V. } these<br>not Past T.) |
| G. <i>niso</i> or <i>niséi</i> , or of this<br><i>ani-so</i> , <i>ani-sei</i>                           | <i>nino</i> or <i>anino</i> .....of these                                 |
| D. <i>nisé-re</i> .....to this                                                                          | <i>nino-ré</i> or <i>anino-ré</i> ...to these                             |
| Acc. <i>nisé</i> -or <i>aiñ</i> .....this                                                               | <i>nino</i> or <i>anino</i> .....these                                    |
| Abl. <i>nisé-zo</i> .....from this                                                                      | <i>nino-zo</i> or <i>anino-zo</i> ...from these                           |
| Instr. <i>nisi</i> .....by this                                                                         | <i>nino-za</i> or <i>anino-za</i> ...by these                             |

When these pronouns are prefixed to substantives, their case-affixes are detached from them and placed after the substantives only, in the form peculiar to the latter ; *e. g.*, *ani mazàr-tang-o*, not *ani-so mazàr-tang-o*.

|                                                        |                                                  |
|--------------------------------------------------------|--------------------------------------------------|
| N. <i>rò</i> ( <i>ré</i> fem )                         | <i>ré</i> or <i>pero</i> (f. <i>ra</i> )         |
| <i>rò-sa</i> (f. <i>ré-sa</i> ). }                     | <i>ré-sa</i> (f. <i>ra-sa</i> ) be- }            |
| before Tr. V. not }                                    | fore Tr. V. not }                                |
| in Past Tense }                                        | Past Tense }                                     |
| G. <i>sò</i> or <i>aso</i> (f. <i>réso</i> )...of that | <i>reno</i> or <i>peràno</i> .....of those       |
| also <i>asé-séi</i>                                    | (f. <i>rano</i> )                                |
| D. <i>sé-ré</i> or <i>asé-ré</i> .....to that          | <i>reno-re</i> or <i>peràno-re</i> to those      |
| (f. <i>résé-ré</i> )                                   | (f. <i>rano-re</i> )                             |
| Acc. <i>sè</i> or <i>asé</i> or <i>do</i> ...that      | <i>reno</i> or <i>peràno</i> .....those          |
| (f. <i>résé</i> )                                      | (f. <i>rano</i> )                                |
| Abl. <i>sé-zo</i> or <i>asé-zo</i> ...from that        | <i>reno-zo</i> or <i>peràno-zo</i> ...from those |
| (f. <i>résé-zo</i> )                                   | (f. <i>rano-zo</i> )                             |
| Instr. <i>sési</i> or <i>àsi</i> .....by that          | <i>reno-za</i> or <i>peràno-za</i> ...by those   |
| (f. <i>résí</i> )                                      | <i>za</i> (f. <i>rano-za</i> )                   |



| Relative Pronoun.               |           | Personal Adjectival Pronouns. |           |
|---------------------------------|-----------|-------------------------------|-----------|
| N. <i>ké</i> or <i>kési</i> (?) | who       | <i>miàno</i>                  | my own    |
| G. <i>késo</i>                  | of whom   | <i>tàno</i>                   | they own  |
| D. <i>késé-re</i>               | to whom   | <i>resano</i> or <i>tomo</i>  | his own   |
| Acc. <i>késé</i> (?)            | whom      | <i>assano</i>                 | our own   |
| Abl. <i>késé-zo</i> (?)         | from whom | <i>tsano</i>                  | your own  |
| Instr. <i>ké-si</i>             | by whom   | <i>renano</i> or <i>tomo</i>  | their own |

The Relative Pronoun is used like the Hindustani *jò*, *jis-ka*, &c., followed by a corresponding demonstrative pronoun later in the sentence : a pronoun *do* seems to be specially employed for this, like *so* in Hindustani, but the other demonstrative pronouns are also used.

#### THE VERB "to be."

##### Present and Future.

| M.                |                                 | F.                 |                          |
|-------------------|---------------------------------|--------------------|--------------------------|
| S. 1.             | <i>moñ hános</i> or <i>hañs</i> | <i>moñ hánis</i>   | I am or shall be         |
| 2.                | <i>tu háno</i> or <i>haoñ</i>   | <i>tu háni</i>     | thou art &c.             |
| 3.                | <i>ro háno</i> or <i>haoñ</i>   | <i>ré háni</i>     | he, she is &c.           |
| Pl. 1.            | <i>bé hánis</i> or <i>hàñs</i>  | <i>bé haiñs</i>    | we are &c.               |
| 2.                | <i>tso hánét</i> or <i>hàñt</i> | <i>tsa haiñt</i>   | ye are &c.               |
| 3.                | <i>ré hán</i>                   | <i>ra hanié</i>    | they are &c.             |
| Past (Imperfect). |                                 |                    |                          |
| S. 1.             | <i>moñ àsilòs</i>               | <i>moñ àsilyis</i> | I was (lit. I was being) |
| 2.                | <i>tu àsilo</i>                 | <i>tu àsilie</i>   | thou wast                |
| 3.                | <i>ro àsilo</i>                 | <i>ré àsilie</i>   | he, she was              |
| Pl. 1.            | <i>bé àsilis</i>                | <i>bé àsilyis</i>  | we were                  |
| 2.                | <i>tso àsilet</i>               | <i>tsa àsiliet</i> | ye were                  |
| 3.                | <i>ré àsile</i>                 | <i>ra àsilie</i>   | they were                |

##### CONDITIONAL.

|        |                     | Past.                |                 |
|--------|---------------------|----------------------|-----------------|
| S. 1.  | <i>moñ àsilòzto</i> | <i>moñ asilazto</i>  | if I were       |
| 2.     | <i>tu asiloto</i>   | <i>tu asilato</i>    | if thou wert    |
| 3.     | <i>ro asilto</i>    | <i>ré asilto</i>     | if he, she were |
| Pl. 1. | <i>be asilezto</i>  | <i>bé asilaseto</i>  | if we were      |
| 2.     | <i>tso asiletto</i> | <i>tsa asilateto</i> | if ye were      |
| 3.     | <i>re asilto</i>    | <i>rà asilato</i>    | if they were    |

#### THE IRREGULAR VERB "to become."

##### Present.

Infinitive and Supine : *bono* "to become," or, "in order to become."  
Imperative, *bé* "become."



|                 | Masc.                 | Fem.                   |                                         |
|-----------------|-----------------------|------------------------|-----------------------------------------|
| S. 1.           | <i>moñ bòmōs</i>      | <i>moñ bomīs</i>       | I am becoming                           |
| 2.              | <i>tu bé</i>          | <i>tu be</i>           | thou art becoming                       |
| 3.              | <i>ro beno</i>        | <i>ré bene</i>         | he, she is becoming                     |
| Pl. 1.          | <i>bé bonas</i>       | <i>bé bonas</i>        | we are becoming                         |
| 2.              | <i>tso bat</i>        | <i>tsa bat</i>         | ye are becoming                         |
| 3.              | <i>ré bena</i>        | <i>ra bena (?)</i>     | they are becoming                       |
| Present Future. |                       |                        |                                         |
| S. 1.           | <i>moñ bom</i>        | <i>moñ bom</i>         | I become <i>or</i> shall become         |
| 2.              | <i>tu besh</i>        | <i>tu besh</i>         | thou becomest &c.                       |
| 3.              | <i>ro bei</i>         | <i>ré bei</i>          | he, she becomes &c.                     |
| Pl. 1.          | <i>bé bon</i>         | <i>bé bon</i>          | we become &c.                           |
| 2.              | <i>tso bat</i>        | <i>tsa bâte</i>        | ye become &c.                           |
| 3.              | <i>ré ben</i>         | <i>ra beni</i>         | they become &c.                         |
| Imperfect.      |                       |                        |                                         |
| S. 1.           | <i>moñ bom-alos*</i>  | <i>moñ bom-alīs</i>    | I was becoming                          |
| 2.              | <i>tu biàlo (?)</i>   | <i>tu biàle (?)</i>    | thou wast becoming                      |
| 3.              | <i>ro biàlo (?)</i>   | <i>re biàlie (?)</i>   | he, she was becoming                    |
| Pl. 1.          | <i>bé bòn-alés</i>    | <i>be bon-alyis</i>    | we were becoming                        |
| 2.              | <i>tso bialet (?)</i> | <i>tsa biàliet (?)</i> | ye were becoming                        |
| 3.              | <i>re beñ-ale</i>     | <i>ra ben-alie</i>     | they were becoming                      |
| Perfect.        |                       |                        |                                         |
| S. 1.           | <i>moñ bilos*</i>     | <i>moñ bilies</i>      | I have become, <i>i. e.</i> , I am      |
| 2.              | <i>tu bilo</i>        | <i>tu biliesh</i>      | thou hast become, <i>i. e.</i> ,        |
|                 |                       |                        | thou art                                |
| 3.              | <i>ro bilo or bil</i> | <i>ré bili</i>         | he, she has become, <i>i. e.</i> , is   |
| Pl. 1.          | <i>bé biles</i>       | <i>bé bilies</i>       | we have become, <i>i. e.</i> , are      |
| 2.              | <i>tso bilet</i>      | <i>tsa bilieti</i>     | ye have become, <i>i. e.</i> , are      |
| 3.              | <i>ré bilén</i>       | <i>ra bilyen</i>       | they have become, <i>i. e.</i> ,<br>are |
| Pluperfect.     |                       |                        |                                         |
| S. 1.           | <i>moñ bilalos</i>    | <i>moñ bilalyis</i>    | I had become                            |
| 2.              | <i>ta bilàlo</i>      | <i>tu bilàlie</i>      | thou hadst become                       |
| 3.              | <i>ro bilàlo</i>      | <i>ré bilàlie</i>      | he, she had become                      |
| Pl. 1.          | <i>bé bilales</i>     | <i>bé bilàlies</i>     | we had become                           |
| 2.              | <i>tsa bilàlet</i>    | <i>tsa bilàliet</i>    | ye had become                           |
| 3.              | <i>ré bilàle</i>      | <i>ra bilàlie</i>      | they had become                         |



## CONDITIONAL.

## Present.

|        |                    |                     |                   |
|--------|--------------------|---------------------|-------------------|
| S. 1.  | <i>moñ bilozto</i> | <i>moñ bilàzto</i>  | if I become       |
| 2.     | <i>tu biloto</i>   | <i>tu bilàto</i>    | if thou becomest  |
| 3.     | <i>ro bilto</i>    | <i>ré bilto</i>     | if he, she become |
| Pl. 1. | <i>bé biletto</i>  | <i>bé bilàseto</i>  | if we become      |
| 2.     | <i>tso biletto</i> | <i>tsà bilateto</i> | if ye become      |
| 3.     | <i>ré bilto</i>    | <i>rà bilàto</i>    | if they become    |

## THE INTRANSITIVE VERB "to go."

Infinitive and Supine : *bozóno* "to go" and "in order to go."

Imperative : *bo* or *bozé* "go."

Verbal Adjectives : *bozensto* "going", *bozeta* "having gone."

## Present.

|        | Masc.                                | Fem.               | English.         |
|--------|--------------------------------------|--------------------|------------------|
| S. 1.  | <i>moñ bòzumus</i>                   | <i>moñ bozumis</i> | I am going       |
| 2.     | <i>tu bòzaoñ</i>                     |                    | thou art going   |
| 3.     | <i>ro bòzon</i> or <i>bòzéuñ</i>     | <i>re bozani</i>   | he, she is going |
| Pl. 1. | <i>bé bòzunàs</i><br>or <i>bònàs</i> |                    | we are going     |
| 2.     | <i>tso bòzàt</i>                     | <i>tsà bozàt</i>   | ye are going     |
| 3.     | <i>ré bòzena</i>                     | <i>ra bozéin</i>   | they are going   |

## Imperfect.

|        |                        |                       |                   |
|--------|------------------------|-----------------------|-------------------|
| S. 1.  | <i>moñ bòzum-alòs*</i> | <i>moñ bòzum-alis</i> | I was going       |
| 2.     | <i>tu bòzalo</i>       | <i>tu bòzale</i>      | thou wast going   |
| 3.     | <i>ro bòzalo</i>       | <i>re bòzalié</i>     | he, she was going |
| Pl. 1. | <i>bé bònalès</i>      | <i>bé bònaliés</i>    | we were going     |
| 2.     | <i>tso bòzalet</i>     | <i>tsà bòzaliét</i>   | ye were going     |
| 3.     | <i>ré bòzenalé</i>     | <i>ra bòzenalié</i>   | they were going   |

## Present Future.

|        |                                   |                  |                  |
|--------|-----------------------------------|------------------|------------------|
| S. 1.  | <i>moñ bòzum</i>                  |                  | I go or shall go |
| 2.     | <i>tù bòzé</i>                    |                  |                  |
| 3.     | <i>ro bòzéi</i>                   | <i>ré bòzéi</i>  |                  |
| Pl. 1. | <i>bé bòzon</i> (or <i>bon</i> ?) |                  |                  |
| 2.     | <i>tso bòzàt</i>                  | <i>tsà bozàt</i> |                  |
| 3.     | <i>ré bòzen</i>                   | <i>ra bozeni</i> |                  |



## Future.

|        |                      |     |     |     |                |
|--------|----------------------|-----|-----|-----|----------------|
| S. 1.  | <i>moñ bōzum bil</i> | ... | ... | ... | I shall go &c. |
| 2.     | <i>tu bōzé bil</i>   | ... | ... | ... | thou wilt go   |
| 3.     | <i>ro bōzéi</i>      | ... | ... | ... | he will go     |
| Pl. 1. | <i>bé bōgon bil</i>  | ... | ... | ... | we shall go    |
| 2.     | <i>tso bōzāt bil</i> | ... | ... | ... | ye will go     |
| 3.     | <i>ré bōzén bil</i>  | ... | ... | ... | they will go   |

## Compound Future.

|        |                       |     |     |     |                |
|--------|-----------------------|-----|-----|-----|----------------|
| S. 1.  | <i>moñ bōno hāns</i>  | ... | ... | ... | I am to go     |
| 2.     | <i>tu bōno haoñ</i>   | ... | ... | ... | thou art to go |
| 3.     | <i>ro bōno haoñ</i>   | ... | ... | ... | he is to go    |
| Pl. 1. | <i>bé bōno hānis</i>  | ... | ... | ... | we are to go   |
| 2.     | <i>tso bōno hānet</i> | ... | ... | ... | ye are to go   |
| 3.     | <i>ré bōno hāñ</i>    | ... | ... | ... | they are to go |

## Past.

|        |                 |                  |              |
|--------|-----------------|------------------|--------------|
| S. 1.  | <i>moñ gās*</i> | <i>moñ gyés</i>  | I went       |
| 2.     | <i>tu gā*</i>   | <i>tu gyé</i>    | thou wentest |
| 3.     | <i>ro gāu*</i>  | <i>ré gyéé</i>   | he, she went |
| Pl. 1. | <i>bé gyès</i>  | <i>be gyéés</i>  | we went      |
| 2.     | <i>tso gyet</i> | <i>tsà gyèti</i> | ye went      |
| 3.     | <i>ré gyé</i>   | <i>ra gyéé</i>   | they went    |

## Perfect and Pluperfect.

|        |                   |                   |                                |
|--------|-------------------|-------------------|--------------------------------|
| S. 1.  | <i>moñ gālòs*</i> | <i>moñ gālís</i>  | I have <i>or</i> had gone      |
| 2.     | <i>tu gālo</i>    | <i>tu gālé</i>    | thou hast <i>or</i> hadst gone |
| 3.     | <i>ro gālo</i>    | <i>ré gālié</i>   | he, she has <i>or</i> had gone |
| Pl. 1. | <i>bé gālís</i>   | <i>bé gālyis</i>  | we have <i>or</i> had gone     |
| 2.     | <i>tso gālet</i>  | <i>tsà gāliet</i> | ye have <i>or</i> had gone     |
| 3.     | <i>ré gālé</i>    | <i>ra gālié</i>   | they have <i>or</i> had gone   |

## CONDITIONAL.

## Present Future.

|        |                    |     |     |     |               |
|--------|--------------------|-----|-----|-----|---------------|
| S. 1.  | <i>moñ bozeto</i>  | ... | ... | ... | if I go       |
| 2.     | <i>tu bozeto</i>   | ... | ... | ... | if thou goest |
| 3.     | <i>ro bozeito</i>  | ... | ... | ... | if he goes    |
| Pl. 1. | <i>bé bozunto</i>  | ... | ... | ... | if we go      |
| 2.     | <i>tso bozatto</i> | ... | ... | ... | if ye go      |
| 3.     | <i>ré bozeñto</i>  | ... | ... | ... | if they go    |

## Preterit.

|       |                    |                    |                    |
|-------|--------------------|--------------------|--------------------|
| S. 1. | <i>moñ gālòsto</i> | <i>moñ gālázto</i> | if I had gone      |
| 2.    | <i>tu gālòto</i>   | <i>tu gālàto</i>   | if thou hadst gone |
| 3.    | <i>ro gielto</i>   | <i>ré gielto</i>   | if he had gone     |



|        |                    |                     |                  |
|--------|--------------------|---------------------|------------------|
| Pl. 1. | <i>bé gálezto</i>  | <i>bé galàseto</i>  | if we had gone   |
| 2.     | <i>tso gàletto</i> | <i>tsà galàteto</i> | if ye had gone   |
| 3.     | <i>ré gielto</i>   | <i>rà galàto</i>    | if they had gone |

|        | Masc.              | Fem.                | English.         |
|--------|--------------------|---------------------|------------------|
| Pl. 1. | <i>bé gálezto</i>  | <i>bé galàseto</i>  | if we had gone   |
| 2.     | <i>too gàletto</i> | <i>tsà galàteto</i> | if ye had gone   |
| 3.     | <i>ré gietto</i>   | <i>tà galato</i>    | if they had gone |

Probably all these tenses (Imperfect or Past, Perfect, and Pluperfect) are compounded of some auxiliary verb-tense running as follows (there is actually such a verb meaning "I came, &c.") :

|    | Masc.             | Fem.        |     | Masc.             | Fem.         |
|----|-------------------|-------------|-----|-------------------|--------------|
| S. | <i>alôs</i> ..... | <i>alis</i> | Pl. | <i>alès</i> ..... | <i>aliès</i> |
|    | <i>alo</i> .....  | <i>alé</i>  |     | <i>alet</i> ..... | <i>aliet</i> |
|    | <i>alo</i> .....  | <i>alié</i> |     | <i>alè</i> .....  | <i>aliè</i>  |

to which are prefixed the various verbal stems or complete verb tenses, person for person. In many cases the combination has subsequently suffered from elision.

*E. g.*, *bil-àlôs*, &c., would be an uncorrupted example. The stem and the auxiliary tense are both perfect, and the former does not vary with the persons.

In *gàlos*, *gàlo*, &c., the verb root (probably *gá*) has suffered its vowel to coalesce with the initial vowel of the auxiliary.

In *bozum-alôs*, *boz-alo*, &c., the auxiliary has destroyed the final syllables of the verb tense, excepting in the 1st pers. Sing. and the 3rd pers. Plural.

In *àsilôs*, *bilôs*, &c., the initial vowel of the auxiliary has itself suffered alteration from the pressure of the verb-root before it.

In the root *as* (of *àsilôs* "I was"), and the root *bi* or *be* (of *bilôs* ? *bi-alôs*, "I have become"), we have perhaps representatives of the universal Arian roots, *bhu* and *as* for the idea of "being" or "existence."

In some verbs the terminations are *òs*, *-ò*, *-ò*.

If again we subdivide the auxiliary tense *alôs*, &c., into its root *al* and its terminations *-òs*, *-o*, *-o*, *ès*, *-et*, and *-e*, it would appear that it was by the addition of these latter to the Present Future Tense, that the Present Tense was formed :

| <i>E. g.</i> | Pr. Fut. Tense. | Termn.     | Present Tense. | Pr. Fut. Tense. | Termn.   | Present Tense. |
|--------------|-----------------|------------|----------------|-----------------|----------|----------------|
| bozum .....  | òs ...          | bòzumus.   | bòzon .....    | ès .....        | bòzonàs. |                |
| bozé.....    | o ...           | bozao (ñ). | bòzàt .....    | et .....        | bòzàt.   |                |
| bozéi .....  | o ...           | bozéu (ñ). | bòzen .....    | é .....         | bòzena.  |                |

TRANSITIVE VERBS are conjugated like intransitive ones. But they show traces of the quasi-Passive formation with the subject in the Instrumentative Case, such as we find in the Past Tenses in Hindustani and in



the Dàrd dialect of Dàh-Hanu (see above). As in the latter, the subject takes a special form in the Past tenses, the singular taking an affix or termination, generally *-i*, and the Plural *-za* (cf. Dàh-Hanu *-ya*); but unlike in that dialect the verb agrees with its proper subject (in the Instrumentative case) and not with its object. In the other Tenses the subject takes the affix *-sa* as in the Dàh-Hanu dialect. This in both dialects is now a simple variety of the nominative.

These facts I think corroborate the hypothesis that the Dàh-Hanu people formed an earlier migration than the Dràs Dàrds. For they retain most fully the quasi-Passive formation of the Past of Transitive Verbs, which we find again in the Indian dialects (from which they had less opportunity of borrowing than the Dràs people had). It was therefore perhaps an early Dàrd formation of which all but slight traces have been lost by the later Dàrds.

#### THE TRANSITIVE VERB "to strike."

Infinitive and Supine = *kutino* "to strike" and "in order to strike."  
= *kutiokuni* "in striking."

Imperative: *kuté* "strike."

Verbal Adjectives: *kutiensto* "striking," *kutéta* and *kutetato* "having struck."

|                  |                                               | Present.                    | English.                              |
|------------------|-----------------------------------------------|-----------------------------|---------------------------------------|
|                  | Masc.                                         | Fem.                        |                                       |
| S.               | 1. <i>moñ-sa kutémus</i>                      | <i>moñ-sa kutémis</i>       | I am striking                         |
|                  | 2. <i>tu-sa kutàon</i>                        | <i>tu-sa kutàn (?)</i>      | thou art striking                     |
|                  | 3. <i>ro-sa kuténo</i> or <i>kutéuñ</i>       | <i>ré-sa kuténi</i>         | he, she is striking                   |
| Pl.              | 1. <i>bé-sa kutónàs</i>                       | <i>bé-sa kutònàs</i>        | we are striking                       |
|                  | 2. <i>tso-sa kutiàt</i>                       | <i>tsà-sa kutiàt</i>        | ye are striking                       |
|                  | 3. <i>ré-sa kuténa</i> (or <i>kuty-òna</i> ). | <i>rà-sa kutéiñ (?)</i>     | they are striking                     |
| Present Future.  |                                               |                             |                                       |
| S.               | 1. <i>moñ-sa kutem</i>                        | .....                       | I strike <i>or</i> shall strike       |
|                  | 2. <i>tu-sa kutez</i> or <i>kuté</i>          | .....                       | thou strikest <i>or</i> wilt strike   |
|                  | 3. <i>ro-sa kutéi</i>                         | <i>ré-sa kutiñ</i>          | he, she strikes <i>or</i> will strike |
| Pl.              | 1. <i>be-sa kutòn</i>                         | .....                       | we strike <i>or</i> shall strike      |
|                  | 2. <i>tso-sa kutiàt</i>                       | .....                       | ye strike <i>or</i> will strike       |
|                  | 3. <i>ré-sa kuten</i>                         | <i>rà-sa kuteni</i>         | they strike <i>or</i> will strike     |
| Compound Future. |                                               |                             |                                       |
| S.               | 1. <i>moñ-sa kutiòno hans</i>                 | <i>moñ-sa kutiòno hànis</i> | I am to strike                        |
|                  | 2. <i>tu-sa kutiòno haoñ</i>                  | <i>tu-sa kutiòno hàni</i>   | thou art to strike                    |
|                  | 3. <i>ro-sa kutiòno haoñ</i>                  | <i>ré-sa kutiòno hàni</i>   | he, she is to strike                  |



|                                   |                             |                    |
|-----------------------------------|-----------------------------|--------------------|
| Pl. 1. <i>bé-sa kutiòno hànìs</i> | <i>bé-sa kutiòno haiñs</i>  | we are to strike   |
| 2. <i>tso-sa kutiòno hànèt</i>    | <i>tsà-sa kutiòno haiñt</i> | ye are to strike   |
| 3. <i>ré-sa kutiòno hàn</i>       | <i>re-sa kutiòno hànìé</i>  | they are to strike |

## Imperfect.

|                                  |                         |                      |
|----------------------------------|-------------------------|----------------------|
| S. 1. <i>moñ-sa kutemàlòs</i>    | <i>moñ-sa kutemàlìs</i> | I was striking       |
| 2. <i>tu-sa kutàlo (kutàlòr)</i> | <i>tu-sa kutàlé</i>     | thou wast striking   |
| 3. <i>ro-sa kutélo</i>           | <i>ré-sa kutélié</i>    | he, she was striking |
| Pl. 1. <i>bé-sa kutonàlés</i>    | <i>bé-sa kutonàlyis</i> | we were striking     |
| 2. <i>tso-sa kutiàlet</i>        | <i>tsa-sa kutiàliet</i> | ye were striking     |
| 3. <i>ré-sa kutenalé</i>         | <i>rà-sa kutenalié</i>  | they were striking   |

## Past.

|                                           |                        |                |
|-------------------------------------------|------------------------|----------------|
| S. 1. <i>mi kutàs (in some verbs -òs)</i> | <i>mi kutiès</i>       | I struck       |
| 2. <i>tò kutà(-o)</i>                     | <i>to kuté</i>         | thou struckest |
| 3. <i>se-si kutàu(-o)</i>                 | <i>re-si kutí</i>      | he, she struck |
| Pl. 1. <i>asso-za kutiès</i>              | <i>asso-za kutièës</i> | we struck      |
| 2. <i>tso-za kutiét</i>                   | <i>tsa-za kutièti</i>  | ye struck      |
| 3. <i>reno-za kutié</i>                   | <i>rano-za kutièë</i>  | they struck    |

## Perfect and Pluperfect.

|                                   |                              |                                  |
|-----------------------------------|------------------------------|----------------------------------|
| S. 1. <i>mi kutàlòs</i>           | <i>mi kutàlìs</i>            | I have <i>or</i> had struck      |
| 2. <i>tò kutàlo (kuté-àsìlòr)</i> | <i>tò kutàli</i>             | thou hast <i>or</i> hadst struck |
| 3. <i>se-si kutàlo</i>            | <i>re-si kutàli</i>          | he, she has <i>or</i> had struck |
| Pl. 1. <i>asso-zo kutiàlìs</i>    | <i>asso-za kutiàlyis (?)</i> | we have <i>or</i> had struck     |
| 2. <i>tso-za kutiàlet</i>         | <i>tso-za kutiàliet (?)</i>  | ye have <i>or</i> had struck     |
| 3. <i>reno-za kutiàlé</i>         | <i>rano-za kutiàli</i>       | they have <i>or</i> had struck   |

## CONDITIONAL.

## Present.

## Past.

|                             |                  |                         |                                     |
|-----------------------------|------------------|-------------------------|-------------------------------------|
| S. 1. <i>moñ-sa kuteto</i>  | if I strike      | <i>moñ-sa kutàlòzto</i> | if I have <i>or</i> had struck      |
| 2. <i>tu-sa kuteto</i>      | if thou strikest | <i>tu-sa kutàlòto</i>   | if thou hast <i>or</i> hadst struck |
| 3. <i>ro-sa kutéito</i>     | if he strike     | <i>ro-sa kutilto</i>    | if he has <i>or</i> had struck      |
| Pl. 1. <i>bé-sa kutunto</i> | if we strike     | <i>bé-sa kutàlezto</i>  | if we have <i>or</i> had struck     |
| 2. <i>tso-sa kutiàtto</i>   | if ye strike     | <i>tso-sa kutàletto</i> | if ye have <i>or</i> had struck     |
| 3. <i>re-sa kuteñto</i>     | if they strike   | <i>ré-sa kutilto</i>    | if they have <i>or</i> had struck   |





## TRANSLATION OF STORIES FROM FORBES'

## PERSIAN GRAMMAR.

1.\* Ek-i kózàlo Afratun-re: "Là bariri nawi-za (? ra)  
 one (Instr.) had-asked Plato (Loc.) many years ship in (Loc.)  
 bètalo ; tò sara-za (? ra) làò safar t'hà. Tò sara  
 (thou) hast-sat thou (Instr.) sea in (Loc.) much voyage madest. Thou (Ins.) sea  
 -za (? ra) 'ajàib zok pàshà?" Afratun-i ràjàu: "moñ salàmat-gi  
 in (Loc.) wonders what sawest? Plato (Instr.) said: I in-safety  
 sara-zo kàtòs chupe-re, àiñ mi pàshàs 'ajàib.  
 sea from came-out shore to this I (Instr.) saw wonderful.

2. Ek paqîrek gàu grestok-o dàrr-ré di zek mangàu  
 a beggar went farmer's door to (?) something demanded  
 Ara-no jawàb kàti: Gòr-ré chéi nùsh. Paqîr-i  
 Inside from answer came-out (f.): House (Loc.) woman is not. Beggar (Instr.)  
 ràjàu: mi tiki tòrik mangàlòs mi chéi né mangàs,  
 said: I (Instr.) bread piece had-demanded I (Instr.) (the) woman not demanded,  
 moñ-re à jawàb làdòs.†  
 me to this (f.) answer arrived.

4. Ek hakim dezgào bòzalo màzàr-tang-ra; tòmo pàsho muka-re  
 a doctor daily used-to-go grave-yard-to his own shawl face to  
 paliéta bòzalo. Zàko-za kozié: Ani-séi zok sabab hani?  
 having-wrapped used-to-go. People (Instr.) asked: this of what reason is (f.)?

Hakim-i ràjàu: Ani màzàr-tang-o mùò-re moñ sharmanda  
 Doctor (Instr.) said: This (f.) grave-yard (Gen.) dead (Loc.) I ashamed  
 hànòs: mioñ ràbàti keta mùé.  
 am: my medicine having-eaten (they) died.

8. Ek manužo-re bwàro krum làdo. Ek dòstek (mubàrak)  
 a man to big work (office) arrived. A friend congratulation  
 t'hièno àlo. Sé-si kòzàu: Tu koi bilo, ki àlo? So dòst  
 in-order-to-make came. That (one) asked: Thou who art, why camest? His friend

\* The numbers are those of the stories in the order given in Forbes' Persian Grammar.

† Here the verb seems to be governed by the person of the Locative or Dative as in other cases it is by that of the Instrumentative. Normally one would think this ought to be *moñ-re à jawàb làdò* or *moñ à jawàb* —  
 me to this answer reached (3rd pers.) I this answer received (1st pers.)



sharmanda bilo, ràjàu: Tu-sa moñ suzân t'hé nūsh dà.  
ashamed has-become, said: Thou (2nd nom.) me recognition makest is not ?

Moñ to purono dòst bilòs, moñ to mutro ròno àlòs; moñ parudòs  
I thy old friend am I thy presence to weep came; I heard  
tu shèiloñ t'hé.  
thou blind makest (becomest).

### COMPARATIVE TABLE OF A FEW ORDINARY WORDS IN THE DRAS DIALECTS OF DAH-HANU AND OF DRAS.

N. B. Kashmiri words added for comparison are marked K. and  
Gaddi (Hindi) G. H. Resemblances to ordinary Hindi are not noted.

| <i>English.</i> | <i>Dàh-Hanu.</i> | <i>Dràs.</i>                       |
|-----------------|------------------|------------------------------------|
| man             | mūsh             | manuzo                             |
| father          | bò               | bàbo                               |
| mother          | ài               | àzé (cf. Gaddi Hindi <i>ijji</i> ) |
| son             | biū              | push                               |
| daughter        | moléi            | dih                                |
| girl            | .....            | molai                              |
| child           | sinà             | balé                               |
| elder brother   | bàyo             | kàko                               |
| younger brother | rzà              | zà                                 |
| wife or woman   | tchigà           | chéi                               |
| grandson        | potro            | potro                              |
| heart           | hō               | hio                                |
| stomach         | krūtpa (Tib.)    | dér                                |
| head            | shish            | shish                              |
| eye             | atchi            | àché (K. <i>ach</i> )              |
| ear             | kàni             | kon                                |
| nose            | nutò             | noto                               |
| tooth           | dàni             | doni                               |
| beard           | rmaghrà          | dài                                |
| breast          | krō              | kroō                               |
| waist           | doko             | dakhri                             |
| hand            | hàt'h            | hàt                                |
| foot            | kūti             | pé                                 |
| lower leg       | kankan           | kiñ (pl. kiñyi)                    |
| knee            | kutò             | kuto                               |
| thigh           | patàli           | patàlò                             |



| <i>English.</i> | <i>Dàh-Hanu.</i> | <i>Dràs.</i>                             |
|-----------------|------------------|------------------------------------------|
| bone            | àti              | àti                                      |
| hair            | zàkur            | zàku                                     |
| mouth           | uzi              | àzi (K. <i>às</i> )                      |
| lip             | öti              | òtò { azino = upper<br>karino = lower    |
| tongue          | gip              | zîp                                      |
| chin            | .....            | mulsutî or chamukhi                      |
| finger          | güli             | añguyé                                   |
| name            | nũñ              | nòm                                      |
| grass           | ghàs             | kash                                     |
| road            | pùn              | pon                                      |
| apricot         | zũ               | zuzu                                     |
| leaf            | pani             | paté                                     |
| birch (tree)    | rũsh (zũsh)      | zozi                                     |
| wheat           | gũm              | gũm                                      |
| barley          | ghono            | yò                                       |
| field           | .....            | trèsh                                    |
| cultivator      | .....            | grestok; * grest ( <i>gròst</i> Kashmir) |
| flower          | pusho            | pushi                                    |
| cow             | gô               | gào                                      |
| crow            | qù               | korkus                                   |
| horse           | àpsh             | àshp                                     |
| dog             | shũà             | shuñ (Kashm. <i>hùn</i> )                |
| cat             | bũlù             | pushu                                    |
| ram             | churdi           | karà                                     |
| ewe             | èi               | esh                                      |
| he-goat         | mingyar          | mugir                                    |
| she-goat        | à                | ài                                       |
| bull            | gôlo             | dòno                                     |
| calf            | bitok            | batsar ( <i>watsir</i> , K.)             |
| lamb            | run              | urun ( <i>urũu</i> , G. H.)              |
| kid             | chal             | chàl ( <i>chélu</i> , G. H.)             |
| cattle          | gôlé             | dòni ( <i>dand</i> , G. H.)              |
| male            | p'hòg (Tib.)     | bîro                                     |
| female          | mòg (Tib.)       | soñti                                    |
| milk            | dũt              | dud                                      |
| cream           | ũspris           | shamal                                   |
| wool            | pash             | pash                                     |
| bear            | .....            | ish                                      |
| frog            | chũstràk         | manòk                                    |

\* *ok* or *ek* seems to be a termination and not a part of the word. Cf. *dòstek* for *dòst*.



1878.]

R. B. Shaw—*Stray Arians in Tibet.*

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| <i>English.</i>               | <i>Dàh-Hanu.</i> | <i>Dràs.</i>                              |
|-------------------------------|------------------|-------------------------------------------|
| sun                           | süri             | sur                                       |
| star                          | turi             | tàré                                      |
| earth (ground)                | pà               | sum                                       |
| moon                          | gyün             | yùn (zùn K.)                              |
| mountain                      | rüng             | qaniya                                    |
| pasture (alp)                 | nirda            | shiaï                                     |
| rock                          | churr            | chir                                      |
| ravine                        | bàrr             | shung                                     |
| river                         | sin              | sín                                       |
| water-course, canal           | gyáp             | yáp                                       |
| rain                          | charchü          | mèg                                       |
| snow                          | àru              | hin (K. <i>shin</i> ), àzo (rain or snow) |
| avalanche                     | .....            | hinäl                                     |
| ice                           | gañs (Tib.)      | sòr                                       |
| water                         | üà               | wéi                                       |
| year                          | sar              | barir                                     |
| month                         | muñs             | moñs ( <i>màns</i> K.)                    |
| day                           | dis              | chag                                      |
| spring (season)               | bazun            | bàzòno                                    |
| summer                        | ulo              | uwàlo                                     |
| autumn                        | sharò            | shàré                                     |
| winter                        | yuno             | yòno                                      |
| to-day                        | àsh              | àsh                                       |
| yesterday                     | run              |                                           |
| to-morrow                     | rutti            |                                           |
| the day before yes-<br>terday | dòg-dis          |                                           |
| night                         | ràt              | ràti                                      |
| work                          | krüm             | krum                                      |
| bread                         | manili           | tiki                                      |
| village                       | bön              |                                           |
| house                         | gòt              | gòr                                       |
| the town of Dràs              | Hembabs (Tib.)   | Hunmas                                    |
| door                          | dàrr             | darr                                      |
| bow                           | shà              | dàhnu                                     |
| arrow                         | qùn              | qòn (K. <i>kàn</i> )                      |
| iron                          | chingàr          | chimir                                    |
| smell                         | ghun             | gon                                       |
| big                           | bono             | bwàro                                     |
| little                        | so               | chuno ( <i>chun</i> Tib.)                 |



| <i>English.</i> | <i>Dàh-Hanu.</i>                     | <i>Dràs.</i>                            |
|-----------------|--------------------------------------|-----------------------------------------|
| old             | .....                                | puròno *                                |
| new             | nö                                   | nào                                     |
| wet             | haridho                              | azo                                     |
| dry             | shuko                                | shuko                                   |
| black           | kyono                                | kino                                    |
| white           | sno                                  | sho                                     |
| red             | lodo                                 | lào                                     |
| I               | moñ ( <i>Gen.</i> miü)               | moñ ( <i>Gen.</i> mion, <i>K.</i> mion) |
| we              | bà or beng ( <i>obl.</i> assü)       | bé ( <i>obl.</i> asso, <i>K.</i> as)    |
| thou            | tü                                   | tü                                      |
| ye              | tsi ( <i>obl.</i> tsü)               | tso ( <i>K.</i> tse)                    |
| this (masc.)    | so ( <i>obl.</i> té) ( <i>K.</i> so) | nu ( <i>obl.</i> nisé)                  |
| this (fem.)     | sa                                   | ni                                      |
| these (m.)      | té ( <i>obl.</i> ten)                | ni ( <i>obl.</i> nino)                  |
| that (m.)       | p'ho                                 | ro ( <i>obl.</i> sé)                    |
| that (f.)       | p'ha                                 | ré ( <i>obl.</i> résé)                  |
| those (m.)      | p'hé ( <i>obl.</i> p'héün)           | ré or però ( <i>obl.</i> reno)          |
| those (f.)      | .....                                | rà ( <i>obl.</i> rano)                  |
| who (relve.)    | .....                                | kési                                    |
| who?            | ko                                   | kói                                     |
| what?           | yé                                   | zok                                     |
| beyond          | beski                                | pàri                                    |
| this side of    | àzū                                  | wàri                                    |
| towards         | suri, lokhshyé                       | wari                                    |
| there yonder    | pàri                                 | perà                                    |
| with            | sūma or tsi-sūma                     | séi-nàlà                                |
| thus            | hang                                 |                                         |
| first (adv.)    | yàr                                  | meza                                    |
| there           | potsi                                |                                         |
| there is        | là, (pl. làn) or bet                 |                                         |
| much } m.       | .....                                | lào                                     |
| or }            |                                      |                                         |
| many } f.       | .....                                | lài                                     |
| very            | .....                                | là                                      |
| I do            | chü or tü                            | t'hiòno (to do)                         |
| I did           | tet                                  | t'hàs                                   |

\* Pronounced also *prono* and *prân*; as in *Prân-Dràs*, a village near Dràs, called by Englishmen *Pândräs*, and sometimes wrongly derived from *Päyin* "low." The name given by Moorcroft for the Dràs lucerne grass, viz. *prangos*, is perhaps merely *prân-kash* "old grass," i. e. "hay;" as lucerne forms the winter fodder of the cattle in the state of hay.



| <i>English.</i>        | <i>Dàh-Hanu.</i>                                   | <i>Dràs.</i>                          |
|------------------------|----------------------------------------------------|---------------------------------------|
| strike                 | kuté                                               | kuté ( <i>Inf.</i> kutiòno and diòno) |
| died                   | mū                                                 | muñ ( <i>Inf.</i> miriòno)            |
| broke                  | pitit                                              | potàu                                 |
| hear                   | qun-té ( <i>imp.</i> )                             | paruzòno ( <i>Inf.</i> )              |
| write                  | zbri-té ( <i>imp.</i> )                            | likiòno ( <i>Inf.</i> )               |
| drink                  | pi ( <i>imp.</i> )                                 | piòno ( <i>Inf.</i> )                 |
| eat                    | .....                                              | ké ( <i>imp.</i> ) (K. <i>khe</i> )   |
| sleep ( <i>imp.</i> )  | sò                                                 | sò, ( <i>Inf.</i> sòno)               |
| sleep ( <i>subs.</i> ) | nish                                               | nish                                  |
| lick                   | li                                                 |                                       |
| weave                  | bo ( <i>imp.</i> )                                 | wiòno ( <i>Inf.</i> )                 |
| cultivate, plough      | bahé ( <i>imp.</i> )                               | bàhn t'hiòno ( <i>Inf.</i> )          |
| give                   | dé                                                 | dé ( <i>Inf.</i> diòno)               |
| see                    | zi                                                 | pàshé                                 |
| look                   | skyé                                               | trakié                                |
| towards                | lokh-skyé                                          |                                       |
| downwards              | kà-skyé) <i>ko</i> = down.                         |                                       |
|                        | <i>Astori</i> )                                    |                                       |
| upwards                | huñ-skyé ( <i>hunn</i> =<br>above. <i>Astori</i> ) |                                       |
| lost                   | nut                                                | noto                                  |
| come ( <i>imp.</i> )   | yé                                                 | é ( <i>wolo</i> K.)                   |
| came                   | ùlla                                               | àlo                                   |
| rise                   | öté                                                | uté                                   |
| dig                    | akū                                                | okoé                                  |
| I speak                | razuñs                                             | ràzem                                 |
| one                    | ek                                                 | ek                                    |
| two                    | dü                                                 | du                                    |
| three                  | trà                                                | tré                                   |
| four                   | chorr                                              | chàr                                  |
| five                   | puñsh                                              | poñsh                                 |
| six                    | shà                                                | shà                                   |
| seven                  | sàt                                                | sàt                                   |
| eight                  | art                                                | art                                   |
| nine                   | nü                                                 | nau                                   |
| ten                    | dàsh                                               | dàis                                  |
| eleven                 | kudish                                             | akài                                  |
| twelve                 | budish                                             | buai                                  |
| thirteen               | tröbish                                            | tröñi (tro'i)                         |
| fourteen               | chudish                                            | chodéi                                |



| <i>English.</i> | <i>Dāh-Hanu.</i>                        | <i>Drās.</i>                         |
|-----------------|-----------------------------------------|--------------------------------------|
| fifteen         | pāndish                                 | pazileñ                              |
| sixteen         | shōbish                                 | shoñi (sho'i)                        |
| seventeen       | satun̄sh                                | satāi                                |
| eighteen        | artun̄sh                                | artāi                                |
| nineteen        | kūnjā (? <i>for</i> ek-ün-<br>bizā 20-1 | kuni (? <i>for</i> ek-un-bi) (20-1)* |
| twenty          | bizā                                    | bī                                   |
| twenty-one      | bizā-ek                                 | bī-ek                                |
| thirty          | bizé-dāsh (20 + 10)                     | tri                                  |
| forty           | du-buzu (2 × 20)                        | dū-bio (2 × 20)                      |
| fifty           | du-buzu-dāsh (2 × 20<br>+ 10)           | dūbio ga dāi (2 × 20 + 10)           |
| sixty           | tra-buzu (3 × 20)                       | tré-bio (3 × 20)                     |
| seventy         | tra-buzu-dāsh                           | tré-bio ga dāi                       |
| eighty          | chār-buzu                               | chār-bio                             |
| ninety          | chār-buzu-dāsh                          | chār-bio ga dāi                      |
| hundred         | sho                                     | shāl                                 |

*On Representations of Foreigners in the Ajantā Frescoes.—By*  
RĀJENDRALĀLA MITRA, LL. D., C.I.E.

(With 4 plates.)

The Ajantā Pass first came to the notice of Europeans during the great battle of Āsāyi, which broke down the Marhattā power; but the caves near it were not visited by any Englishman until several years afterwards. According to Mr. Burgess, some officers of the Madras army were the first to visit them in 1819, and Col. Morgan of the Madras army wrote a short notice of them, which appeared in Mr. Erskine's 'Remains of the Buddhists in India.' Then followed Lieut. J. E. Alexander in 1824, and his account was published by the Royal Asiatic Society in 1829.† Dr. Bird visited the place by order of Sir John Malcolm in 1828, at the same time when Capt. Grisley and Lieut. Ralp were at the place. The account of the former appeared in his "Researches into the Cave Temples of Western India," a meagre and faulty account, utterly untrustworthy for all historical purposes. The description of the latter appeared in this Journal.‡ It is graphic and en-

\* These seem to retain a trace (*k* for *ek*) of the deducted unit itself, which Sanskrit had lost (cf. *ūnavinsati*), but of which Pāli seems to show the original presence, (*ekūnavīsati*).

† Transactions Rl. As. Soc., I, p. 557.

‡ Ante V.



thusiastic, but calculated more to rouse than to allay the curiosity of the reader. Mr. Burgess says, "A somewhat interesting and correct topographical account of them, was subsequently (1839) published in the "Bombay Courier", and republished in a pamphlet form, but I have not seen the brochure. Soon after, came out Mr. Fergusson's description in his Memoir on the "Rock-cut Temples of India," (1843) and laid the foundation of a critical study of these remarkable works of art. It drew to them the attention of the Court of Directors, and Capt. Gill was, six or seven years after, deputed to prepare facsimile drawings of the fresco paintings which adorn most of the caves. His report was published in 1855, but it was meagre, like the works of his predecessors, and subserved, like them, only to whet the desire for further information. Dr. Wilson's account, in his paper on the "Ancient Remains of Western India", published in 1850, in the Journal of the Bombay Asiatic Society\*, is a mere resumé of what was then known, and Dr. John Muir's subsequent notice professes to give nothing more than a foretaste of what may be seen at the place. Dr. Bhau Dáji came to Ajantā in 1865, and took facsimiles of most of the inscriptions, some of which had been previously noticed by James Prinsep, and published translations of them in the Bombay Journal.† The translations are generally correct and of great value, but the general remarks on the nature of the caves and their ornaments are brief and not always satisfactory. The learned gentleman had the intention of writing a separate paper on the subject, but his untimely and lamented death prevented his carrying out the intention. Since his death several notices have appeared in the 'Indian Antiquary' which are highly interesting, but none of them is exhaustive.

When Major Gill's copies of these curious works of art were sent to Europe, it was expected that antiquarians in England would take them in hand, and submit to the public a full and comprehensive critical account of their character, and the subjects they portray. But the copies were destroyed by fire in the Sydenham Crystal Palace, and nothing came of them. In the meantime the originals suffered greatly from leakage in the caves and want of care, and it was apprehended that in a few years more they would be totally lost. A representation was accordingly made to Government to adopt some measures for their preservation. Thereupon a party of draftsmen, under the superintendence of Mr. Griffiths, Principal of the Art School at Bombay, was deputed in 1872-73 to prepare copies of all the printings which were still legible. The result was a "collection of excellent copies of four large wall-paintings covering 122 square feet of canvas, 160 panels of ceiling, aggregating about 280 square feet, 16 moulds from the sculptures, and several drawings." In reporting on these Mr. Griffiths says:

\* Vol. III, pp. 71ff.

† Vol. VII.



"The artists who painted them, were giants in execution. Even on the vertical sides of the walls some of the lines which were drawn with one sweep of the brush struck me as being very wonderful; but when I saw long delicate curves drawn without faltering with equal precision upon the horizontal surface of a ceiling, where the difficulty of execution is increased a thousand-fold, it appeared to me nothing less than miraculous. One of the students, when hoisted up on the scaffolding, tracing his first panel on the ceiling, naturally remarked that some of the work looked like a child's work; little thinking that what appeared to him up there as rough and meaningless, had been laid in by a cunning hand, so that when seen at its right distance, every touch fell into its proper place.

"The condition of mind in which these paintings at Ajantā were originated and executed must have been very similar to that which produced the early Italian paintings of the fourteenth century, as we find much that is in common. Little attention paid to the science of art, a general crowding of figures into a subject, regard being had more to the truthful rendering of a story than to a beautiful rendering of it; not that they discarded beauty, but they did not make it the primary motive of representation. There is a want of aerial perspective—the parts are delicately shaded, not forced by light and shade, giving the whole a look of flatness—a quality to be desired in mural decoration.

"Whoever were the authors of these paintings, they must have constantly mixed with the world. Scenes of every-day life, such as preparing food, carrying water, buying and selling, processions, hunting-scenes, elephant-fights, men and women engaged in singing, dancing, and playing on musical instruments, are most gracefully depicted upon these walls; and they could only have been done by men who were constant spectators of such scenes, by men of keen observation and retentive memories. \* \* \* \* In every example that has come under my observation, the action of the hands is admirable and unmistakeable in conveying the particular expression the artist intended."\*

Adverting to the second picture he says: "Parts of this picture are admirably executed. In addition to the natural grace and ease with which she is standing, the drawing of the woman holding a casket in one hand, and a jewel with a string of pearls hanging from it in the other, is most delicately and truly rendered. The same applies to the woman seated on the ground in the left hand corner. The upward gaze and sweet expression of the mouth are beautifully given. The left hand of the same woman...is drawn with great subtlety and tenderness."† "The third picture", he remarks, "contains eight figures and portions of three others, all of which are seated or standing upon large lotus flowers with nimbi round the heads. The

\* Indian Antiquary, III. 26.

† Ibid., loc. cit.



action of some of the figures, especially the standing ones, bears such a very striking resemblance to what is characteristic of the figures in Christian art, that they might have been taken from some mediæval Church, rather than from the caves of Ajantâ. The delicate foliage which fills in the spaces between the figures will give some idea of the power of these old artists as designers, and also of their knowledge of the growth of plants."\*

Referring to a picture in cave No. 16 he observes: "This picture, I consider, cannot be surpassed in the history of art. The Florentine could have put better drawing and the Venetian better colour, but neither could have thrown greater expression into it. The dying woman, with drooping head, half-closed eyes, and languid limbs, reclines on a bed the like of which may be found in any native house of the present day. She is tenderly supported by a female attendant, whilst another, with eager gaze, is looking into her face, and holding the sick woman's arms, as if in the act of feeling her pulse. The expression on her face is one of deep anxiety, as she seems to realize how soon life will be extinct in one she loves. Another female behind is in attendance with a *pankâ*, whilst two men on the left are looking on with the expression of profound grief depicted in their faces. Below are seated on the floor other relations, who appear to have given up all hope, and to have begun their days of mourning,—for one woman has buried her face in her hands, and, apparently, is weeping bitterly."†

And he sums up the value of the whole by saying—"For the purposes of art-education, no better examples could be placed before an Indian art-student than those to be found in the caves of Ajantâ. Here we have art with life in it, human faces full of expression,—limbs drawn with grace and action, flowers which bloom, birds which soar, and beasts that spring, or fight, or patiently carry burdens: all are taken from Nature's book—growing after her pattern, and in this respect differing entirely from Muhammadan art, which is unreal, unnatural, and therefore incapable of development."‡

It is to be regretted, however, that as yet no attempt has been made to secure for the public a detailed, descriptive, critical and historical account of these relics. At one time a proposition was made to place the drawings at the disposal of Mr. Fergusson for the purpose; but, I believe, it has since fallen through.

The Government of India has, however, in the meantime, caused photographic impressions to be taken of Mr. Griffiths' drawings, and copies thereof sent to Societies interested in Indian Archæology. Three batches of these photographs have, from time to time, been received by the Asiatic Society of Bengal, and they fully bear out Mr. Griffiths' remarks regarding their value.

\* Loc. cit., p. 27.

† Ibid., p. 27.

‡ Ibid., p. 28.



A large number of the photographs represent architectural details and floral scrolls of much importance as illustrations of ancient art-designs in this country, and are well worthy of careful study. There are others representing scenes in the legendary life of Buddha, which are of considerable value in connexion with the antiquity of the legends which they illustrate. While a few depict scenes from private life, or state pageantry, which afford interesting details regarding the manners, customs, habits, social condition, and intercourse of foreigners with the people of Western India, two thousand years ago.

Messrs. Ralph and Grisley were the first to notice the existence of foreigners in these frescoes. In their animated and scenic correspondence, mention is repeatedly made of foreigners as distinct from the natives. In one place they say: "Here is a lovely face, a Madonna face. What eyes! She looks towards the moon. Observe, these are Hindu faces—nothing foreign."\* Elsewhere, "Observe that Abyssinian black prince seated on a bed—remark his ornaments. Now the woman seated on his left knee whom he embraces is as fair as you or I. Did these fellows get Georgian slaves?" Again: "Here are evidently three beauties in this apartment—one an African, one copper-coloured, one of a *European* complexion. Yes; and how frequently we see these intermixed. See this, R. is a fair man, a eunuch." Again, "How often we see people of three complexions in the same panel! Now this is the most extraordinary thing we have found. Here are three placid portraits—they are *Chinese*. Nothing can be plainer;—observe the style of their hair;—the women have locks brought down in ringlets over their faces, and falling on to the neck, like some of the Hampton Court beauties." The writers did not, however, attempt to define the character of these foreigners, in any detail. It will not be uninteresting, therefore, to examine at length the peculiarities of a few of the figures shown in the photographs.

The first picture I have to notice is a court-scene on the south side of the cave No. I. In Messrs. Ralph and Grisley's paper it is thus described: "Here is a fair man of full age, dressed in a robe and cap, like some monk or abbot. Here is, next to him, a half-naked Brahman, copper-coloured, with shaven crown, and the single lock on his head. Here is a man presenting him with a scroll on which *something is written*. He is in a crowded court,—he has come to an audience." In the original this picture measures 15' × 6'-6". (Plate II.) It represents a large audience chamber with colonnaded side aisles, and a large portal in front. The room is carpeted with some stuff bearing sprigs on a black, or dark-coloured, ground. On the centre is a *charpai* or bedstead, which serves the purpose of a throne. It has four feet of the ordinary modern make, with a tape-woven top, such as is to be met with in every decently furnished house in northern India in the present day. Over it is a mattress of striped cloth, and on the off side a large pillow or *takiá*, having behind

\* *Ante*, Vol. V, p. 558.



it an ornamented head-piece shaped like a corona. A king or chief is seated, squatting on this throne in the usual oriental style, dressed in a flowing *dhuti* or body-cloth, a *chádar* tied round the waist, and a tunic of some kind whose character is not apparent. He wears a rich heavy crown, bracelets and necklaces, one of the last being worn athwart the chest, very like a Bráhmañical cord. The face and parts of the arms and chest are destroyed or smudged over. In front of the throne there is a man seated, holding an ox-tail *chauri*, and having in front of him a curious ornament, shaped like a cornucopia. To the right there are four other persons seated on the ground, one of them having in front a tray placed on a tripod stand. The pose of the person is like that of a Bráhmañ engaged in worship. Behind and on the two sides of the throne, there are several persons,—officers of state, courtiers, body-guard, and menials,—standing in different attitudes, some dressed in *dhuti* only, others with tunics or made dresses, the character of which, owing to the smudgy condition of the picture, cannot be satisfactorily made out, except in one case in which a pair of close-fitting trousers and a *chapkan* are unmistakable. Some are armed with clubs, and one, near the entrance to the hall, upholds a standard. Their shaven chin, oriental head-dress, dark complexion, and characteristic features leave no doubt in my mind that they are all Indians. Among them there are four females, one standing behind the throne, and three seated on the carpet on the left side. In marked contrast to these are three persons standing in front of the king, and four others at a little distance. The foremost among them has a sugar-loaf-shaped hat with a black band, a large flowing gown of white stuff, a striped jacket, and a dagger held in a cloth girdle. The lower part of the gown or long coat is partially covered by the figure of the Bráhmañ engaged in worship, but from the portion which is visible, it is evident that it extended below the middle of the leg. Between the girdle and the lower edge of the jacket there is a waist-band buckled in front. Round his neck there is a necklace with a large locket. He is in the attitude of making a courtesy to the king, with his right hand passed under the jacket and placed on the left breast, and the left holding out a folded letter. The second person, dressed in the same style, but with a black jacket, is standing with folded hands in token of respect. His hat has no band. The third has a Persian helmet, with a crescent on top and a rosette on one side. He is bearing a tray full of presents of some kind. At a little distance from the last, just entering the hall, there is another person of the same nationality, bearing a tray, and outside the door there are two or three others who are evidently servants of the persons who have entered the hall, and belonging to the same nationality. The lower part of the gowns of these is not visible, but it must be the same as in the case



of the foremost figure. The coat of the man with a helmet is probably short.

The complexion of these persons, except the first, is markedly fair. Studying the group carefully the conclusion appears inevitable that it represents an embassy from a foreign country. The foremost person is the ambassador, who is presenting his credentials in open court to the Indian potentate. Behind him is his secretary, and then follow the bearers of the *nazr* or presents from the foreign court.

But whence is this embassy? and what is the nationality of the persons who compose it? We are aware of no Indian race or tribe which differed so materially and markedly in complexion, features, and dress from the natives of the country as represented in the court. From beyond India on the north and the east, there was no nation which, two thousand years ago, could have presented such a group. We must look to the North-West, therefore, for the birth-place of the ambassador and his suite. Now on that side we had the Afghans, the Bactrians, the Scythians, and the Persians. But the Afghans never had the peculiar sugar-loaf hat, nor the flowing gown, nor the crescented helmet. Their features too, were, as shall be presently shown, coarser and rude. The Bactrian and the Scythian dresses, to judge from numismatic evidence—the only evidence available in the case,—were also different. The coat was short, the trousers tight-fitting, and the head-gear very unlike a sugar-loaf hat. The Persian dress, however, as we now have it, is the exact counterpart of what appears in the picture. The hat, the gown and the jacket are identically the same.

The helmet appears repeatedly in the sculptures of Khorsábád and Nineveh, and the features and the beard are in no way different. We may, therefore, safely conclude that the picture represents a group of Persians, either merchants, or an embassy from Persia to an Indian court, probably the latter, as the letter in the hand of the foremost person would be redundant in a merchant. I am not aware of any mention of such an embassy in Buddhist religious history; but I have read but a small portion of Buddhist literature, and as it is abundantly evident that the frescoes of Ajantá were not confined to representations of religious history, it is not necessary to hunt up any relationship with it of Buddhist legends. Nor is it material to know whether the representation is historical or an ideal one. In either case it shows that the Indians of old had free intercourse with the Persians, and were thoroughly familiar with their features and dress. Literary evidence on this subject may be had in abundance in Sanskrit literature, but it is not necessary to adduce it here.

The second scene I have to describe is a domestic one, and three editions of it occur in the collection of photographs before me. There is no indication, however, to show whence they have been taken. The scales attached



show them to be of large size, about 30 × 28 ft. In its simplest version (Plate III) it represents a divan placed in front of a cloth screen, and covered with cushions and a check pattern coverlet; and on it are seated a big, stout, burly-looking man and a lady by his side. The man is seated cross-legged, and is in an amatory mood, perhaps somewhat befuddled with wine. His face is heavy and square, and he has both a beard and a moustache. He wears long hair covered by a thick conical cap with a turban, or a fur band around it like the Qilpâq cap of the Central Asiatic races of the present day. On his body is a coat or tunic reaching to the knee and trimmed with, what appears to me, patch-work decorations; knee-breeches and striped stockings complete his dress. He holds a cup in his left hand, and before him, on the ground, in front of the divan, there is a covered tray. The lady beside him has a gown reaching to the knee, a shell-jacket, (both set off with patch-work trimmings,) and a pair of striped stockings. She has a skull cap on her head, and earrings. Her right hand is lifted as in the act of telling something interesting to her lord. To the right of the man, in front of the divan, there stands a maid, arrayed in a long flowing gown which leaves only the tips of her shoes visible, and holding a flagon, shaped like a soda-water bottle with a long narrow neck, ready to replenish the cup of her lord. Behind the mistress there is a second maid with a wide-mouthed covered jar in her hand.

In the second version the man holds the cup in his right hand, and a stick or straight sword in his left. He has also an elaborately-worked belt, and the trimmings of the coats and gowns are of different patterns. The lady leans on the shoulder of her lord by her right hand, and by her attitude expresses great solicitude to please him. There is also a third maid, squatting in front, and ready to serve out edibles from the covered tray beside her.

The third version is even more developed. (Plate IV). The screen behind the divan is set off with floral designs. The coat of the hero and the gown of his lady, and also that of her maid, are set off with triangular striped streamers flying from the back. The features of the lady are vivid with life, and the expression of endearment on her face is truly admirable. The second maid holds a *surâhi* or goglet instead of a jar. The lady has, instead of a cap, a fillet round her head with an aigrette in front, and the maids similar fillets, but without the jewel. The third maid is replaced by two bearded, thick-lipped Negro-looking servants who are serving out dishes from the covered tray. The stockings in the last two versions are white. In two small panels the male figure is reproduced in company with another male,—two jovial companions, engaged in pledging their faith to each other over a cup of liquor. (See Plate V, fig. 1). The striped stockings are distinctly seen in these, as also a pair of check-pattern trousers, not striped.



There are more than five hundred representations of Indian men and women in the photographs, but they appear totally unlike the human figures shown in these plates, and, bearing in mind the fact that the artists of these frescoes were most faithful in delineating the peculiarities of their subjects, it is impossible to deny that they took their models for these from other than Indians. It is difficult, however, to determine what nationality they had in view. The features, the cap and the turban of the principal figure, are the exact counterparts of what may be every day seen in the Kabulese fruit-sellers in the streets of Calcutta ; but the coat is different. I have never seen an Afghan woman in her native dress, but the gown and the jacket of the female figures appear very like those of Jewesses. The patch-work trimmings are peculiar to them, and the best specimens of the kind of work I have seen are of Jewish make. The Afghans, however, are in no way inferior in this art : they bring to Calcutta every year a number of rugs and other articles of patch-work, which are remarkably beautiful. Knowing how such domestic arts as needle-work and patch-work are perpetuated for generations, and looking at the complexion, the cap and the turban, I was first disposed to believe that the figures on these plates represented Afghans, the thick-lipped servants being Negroes.

In the Zodiac Cave (No. XVI) Dr. Bhau Dāji found an inscription which once "contained the names of seven or eight kings of the Vákātaka dynasty, but only that of Vindhyaśakti, the oldest and most eminent, was preserved intact." "By a strange fatality," says the writer, "the inscription has been obliterated wherever a royal name existed, so that one is tempted to suppose that the destruction was intentional. But," he adds, "the destructive influence of the rainy weather is sufficient to account for the gaps."\* The name of this Vindhyaśakti's country is mentioned in the Seoni copper-plate ; but the chief himself is not named there. Dr. Bhau Dāji identifies this Vindhyaśakti with a chief of the Kailakila Yavanas who, according to the Vishṇu Purāṇa, once ruled in India. Having advanced thus far, he takes Kailikila to be identical with an ancient city and citadel named Ghúlghúleh near Bámián, mentioned by Mr. Masson in his paper on the Antiquities of Bamian (*ante*, v. 708), and Vákātaka with Bactria, thereby suggesting, though not positively asserting, that the Bactrian Greeks were the authors of the Ajantá caves. If this reasoning be admitted, the figures we have shown would be those of Bactrian Greeks. But there are various difficulties to overcome before we can accept the identification. The name Vindhyaśakti is too thorough a Sanskrit word to be the name of a Bactrian Greek, and there is nothing to connect him with the princes of the Seoni plate, except the word Vákātaka, which, as given in the Seoni plate, is

\* Journal, Bombay As. Soc., VII, p. 65.



unmistakably the name of an Indian, and not of a trans-Indian locality, particularly Bactrian, for which the usual and very extensively-employed term is Válhika. In the Purápas these Válhikas are said to have reigned after Vindhyaśakti. Denying, however, the accuracy of the identification of Vákátaka with Bactria and of Vindhyaśakti having been a Bactrian, it might still be said that the figures under notice are Bactrians. In some Kenerki coins the cap is conical, and surrounded by a turban or a band of fur like the Qilpáq cap; the cut of the coat is of the same style, and the close-fitting trousers and stockings are, as far as can be made out in coins, the same. The coarse square face of the Mongolian type is particularly remarkable, and, as the Bactrians exercised supremacy for some time in India from a little before the commencement of the Christian era, to nearly a century after it, it would be much more reasonable to suppose the representations to be of Bactrians, rather than those of Afghans, who attained to no political distinction at the time, and were to some extent included among the Hindus.

The stockings of the peculiar pattern which has hitherto been thought to be the outcome of modern European art, are remarkable: I have noticed them nowhere else in Indian paintings or sculpture. The Hindus seem to have borrowed the stockings from their neighbours; for in a panel in Cave No. I, there is a representation of an Indian bacchanalian scene, unmistakable from the features and dress, in which they have been reproduced on the legs of a man and his lady-love. Before the importation of stockings from Europe, the Indians got their supplies from Káshmir. I do not, however, know when knitted stockings were first introduced into that country. To England they first came in the reign of Henry VIII, and it is extremely doubtful if they were of much more ancient date in Káshmir. And after all what I take to be stockings might be sewed hose of cloth or milled stuff of some kind.

The indulgence in spirituous drinks was common all over India, Bactria and Persia in ancient times, and the evidence of it in the frescoes does not call for any notice.\* That the cup and the flagon indicate something more potent than sherbet, I believe, none will question.

The curtains behind the divan suggest the idea that the sites of the Bactrian domestic scenes were tents, and that the people shown had not become settled inhabitants of the country. But the evidence in this respect is too meagre to attach any importance to such an idea.

Looking to the made-dresses of the Persians and the Bactrians, it might be supposed that the Indians got theirs from those sources; but, as I have shown in my "Antiquities of Orissa," such was not the case, at least when the Ajantá frescoes were painted. In the Indian bacchanalian scene above noticed, the dresses of the Indian man and woman are quite different, and

\* *Vide passim* my paper on 'Spirituous Drinks in Ancient India,' *ante*, XLII, pp. 1 ff.



by no means such as to justify the assumption that they had been designed from foreign models. In the very affecting picture of the death of a lady of rank in Cave No. XVI, the bodices shown on some of the maid-servants engaged in grinding corn in hand-mills, are quite unlike the jackets of the Bactrian women.

In an Indian scene in Cave No. I, where a large number of sable beauties are exhibited, there is a figure seated cross-legged, whose dark features, punchy belly and style of sitting, leave no doubt in my mind of his nationality; and he is dressed in a *dhuti* which leaves a part of his thigh exposed, and a *mírzáí* of flowered muslin which is thoroughly Indian, and the like of it has nowhere been seen out of India. (See plate V, fig. 2.) The *mírzáí* is in use by the Hindus to this day all over northern India, and its make seems not to have changed in the least since the time of the fresco.

It is not my intention to enter into a discussion here as to the date of the Ajantá Caves. The late Dr. Wilson of Bombay took them to extend from the third or second century before, to the fifth or sixth century after, Christ.\* Mr. Burgess, after a careful study of the Caves, states "that the oldest of them cannot be later than the second century before the Christian era." Long before him Mr. Fergusson came to the same conclusion in his 'Rock-cut Caves of India,' and in his 'History of Eastern Architecture' remarked that Cave No. XII, "the façade of which so much resembles that of the Násik Chaitya (B. C. 129), cannot be far off in date" (p. 122). The latest are supposed to be of the 5th or 6th century. Accepting this opinion for my guide, and there is not much to show that it is untenable, and bearing in mind that Cave No. I is one of the largest and richest in paintings which long preceded sculpture, I may fairly come to the conclusion that the scenes I have described above represent phases of Indian life from eighteen hundred to two thousand years ago.

\* Journal, Bombay As. Soc., III, p. 73.



*A Copper-plate Grant from Bandá.*—By RÁJENDRALÁLA  
MITRA, LL.D., C.I.E.

(With a plate.)

The Society is indebted to Mr. A. Cadell, Asst. Magistrate, Bandá, in the N. W. Provinces, for the sight of a Copper-plate found in Parganah Augási of the Bandá district. The plate measures  $16\frac{1}{2}$  inches by  $10\frac{1}{2}$ , and is in an excellent state of preservation. (See plate VI.) It is a hammered one; very rough on the outer face, but moderately smooth on the inscribed side. Round its edges slips of metal have been very roughly and clumsily rivetted on to form a raised rim for the purpose of preventing the inscription from being easily rubbed off. At the middle of the lower edge, close by the rim, is a round hole, half an inch in diameter. It was intended for a ring which bore the seal of the donor, and perhaps also held together two plates, one of which is missing. If a second plate did once exist, it was intended only as a cover for the first and bore no inscription, for the latter contains the whole of a deed of conveyance, with a colophon giving the name of the writer and engraver of the record, and hitherto no document of the kind has been found which contains any thing after the name of the engraver. The record is inscribed longitudinally, and comprises nineteen lines, the first four of which have a break in the middle, caused by an outline figure of the goddess Rájalakshmi with two elephants standing on expanded lotuses, and pouring water on her head. The writing is of the Kuṭila type, but slender in body, and verging to the modern Nágari character. It records the grant of 'ten ploughs' of land in the village of Ramuraḍá, which is situated in the circle of Sudáli, to a Bráhmaṇa named Gabhanta S'arman, the son of Jáṭa, the grandson of Sátti, and great-grandson of Vapana, a member of the Vájasaneyi school of the Bháradvája gotra, having the threefold Pravara of Bharadvāja, Āngirasa, Várhaspatya, and an inhabitant of the village of Dhakari. The boundary of the plot is given in detail, and the date of the gift was Monday, the 5th of the waxing moon in the month of Mágha, Samvat 1190 = A. C. 1135.

The donor was Madanavarma Deva, a devout follower of S'iva. His immediate predecessor was Pṛithivívarma Deva, who had succeeded Kirtivarma Deva.

The first monument of this line of princes was brought to the notice of the Society by Lieutenant William Price, in 1813. It was a large inscribed stone found on a rocky hill in the vicinity of the town of Mau, about ten miles from Chhattarpur. The record was in a bad state of preservation, and the transcript and translation of it published in the 'Asiatic Researches'

\* Vol. XII, pp. 359 *et seq.*



are full of lacunæ. It comprises the history of nine princes with the names of their ministers.

The second record was found by Capt. T. S. Burt in 1838. It too was an inscribed slab, which had been detached from one of several temples at Khajráha, nine kos from Chhattarpur, which is on the high road from Saiyar and Hamírpur, close by the fortified town of Rájgarh, on the right bank of the Kám river, S. W. from Chhattarpur. It gives the names of six predecessors of Dhánga.\*

The third was communicated to me by Major-General Cunningham, who found it at Khajráha.† It was a short record of 13 lines, but it was of value in settling the date of the dynasty on a sure footing. In commenting upon it I pointed out the relation it bore to the two preceding monuments, and the results deducible from a reading of the three inscriptions together. The conclusion I then arrived at regarding the date of Madanavarma, the last prince of the line, was, that he must have lived about the middle of the twelfth century. The exact date given by the copper-plate now under notice is Samvat 1190 = A. D. 1135. The name of the immediate predecessor of Prithivivarma, the father of Madana, in Lieutenant Price's inscription, is Sallakshanavarma; but this appears to be an *alias* or title, the real name being Kirtivarma in the copper-plate. Putting the names found in the four inscriptions together with such corrections as the several records have helped me to make, I arrive at the following genealogy. Altogether we have sixteen names. Of these, documentary evidence exists for the dates of three; the 7th king, Dhánga, being assigned by two records to Samvat 1011 and 1019 respectively; the 13th by one to Samvat 1173; and the 16th by another to 1190. For the rest we have to depend upon averages. For reasons assigned in my paper on the Khajráha inscriptions, the earlier reigns may be taken to have been long, but some of the later must have been very short. Dhánga is said to have lived 109 summers, and then to have resigned his life at the confluence of the Yamuná and the Ganges, and this led Mr. Sutherland and those who wrote after him to suppose that the prince had committed suicide. Such is, however, not the inevitable meaning of the passage. To this day the ordinary civil way of announcing a death is to say, so-and-so has surrendered his life to the holy river so-and-so or the sacred pool (*Kshetra*) so-and-so, and the inscription has probably adopted the same mode of expression.

|      |                                                 |     |     |
|------|-------------------------------------------------|-----|-----|
| I.   | Nannuka, of the Chandrártreya race A. D., ..... | 746 | 771 |
| II.  | Vágyati or Vákpati, son of I, .....             | 771 | 798 |
| III. | Viyaya, son of II, .....                        | 898 | 823 |
| IV.  | Váhila or Ráhila, son of III, .....             | 823 | 848 |

\* Journal, As. Soc., VIII, p. 169.

† Ibid., XXXII, pp. 273f.



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|       |                                                                                             |      |      |
|-------|---------------------------------------------------------------------------------------------|------|------|
| V.    | Sriharsha, son of IV,.....                                                                  | 848  | 873  |
| VI.   | Yasodharma, son of V, by Kankutá, .....                                                     | 873  | 900  |
| VII.  | Dhánga, { son of VI, by Narmadevi, Minister }<br>{ —Prabhása, }                             | 900  | 962  |
| VIII. | Gaṇḍa Deva, Minister—Prabhása, .....                                                        | 952  | 988  |
| IX.   | Vidyádharma Deva, Minister—Sivanáma, son of last, .....                                     | 983  | 1103 |
| X.    | Viyayyapála, Minister—Mahipála, son of last, ...                                            | 1103 | 1023 |
| XI.   | Kirtivarma Deva, Minister—Ananta, .....                                                     | 1024 | 1045 |
| XII.  | Varma Deva, Minister—Yogeśvara, son of last,...                                             | 1045 | 1065 |
| XIII. | Jayavarma Deva, Minister—ditto,.....                                                        | 1110 | 1120 |
| XIV.  | Kirtivarma Deva <i>alias</i> Sallakshana, Minister—<br>Vatsa and other sons of Ananta,..... | 1120 | 1130 |
| XV.   | Prithvivarma Deva, ditto,.....                                                              | 1120 | 1130 |
| XVI.  | Madanavarma Deva, Minister—Gadádharma,.....                                                 | 1130 | 1150 |

The annexed translation of the record has been prepared for me by my young friend Bábu Durgaráma Basu, Pleader, High Court of Calcutta.

*Translation of an inscription from Parganah Augási, Bandá.*

May this be auspicious!

The dynasty of the kings of the lunar race, glorious as the moon on the forehead of the god of the universe, (Viśveśvara) gladdening the universe, prospers. In that noble and flourishing dynasty, rendered resplendent by heroes like Jayaśakti and Vijayaśakti, the king of Kálanjara, the fortunate Madanavarma Deva, the highly revered, the great king over great kings, the supreme lord, the devout worshipper of Śiva, successor of the highly revered, the great king over great kings, the supreme lord, the fortunate Prithvivarma Deva, *who was* the successor of the highly revered, the great king over great kings, the supreme lord, the fortunate Kirtivarma Deva, reigns supreme. He, having subdued his enemies by his irresistible majesty, untroubled holds the earth like a married wife, and thereby keeps his intellect unclouded, and his conscience unsullied. He commands all his relatives, Káyasthas, and other great men inhabiting the village of Rámuraḍá within the district of Sudáli:—"Be it known unto you that, on Monday, on the day of the full moon, in the month of Mágha, of the Samvat year eleven hundred and ninety (in figures 15th Sudi, Magh, Samvat 1190) I have, after having duly bathed in holy water, after offering oblations to the gods, having worshipped the sun and the lord of Bhavání (Śiva) and after offering oblations to the fire, for the promotion of virtue of my parents and of myself, with water held in my hand and consecrated with kuśa grass, and having pronounced the word Svasti (let this be auspicious), bestowed, for the period of the duration of the sun and the moon, on the Bráhmaṇa Gabhanta Śarmá, son of Játa, grandson of Sátti, great-grandson of Bápan, of the Vájasaneyya branch (*Sákhá*) of the Bharadvāja gotra having Bharadvāja, An-



girasa and Várhaspatya for his threefold *Prabara*, an inhabitant of the village of Dhakari, making the gift descendable to his sons, grandsons and successive descendants, ten ploughs of land (in figures 10 ploughs) in the above named village, the said land requiring seven and a half *droṇas* of seed for cultivation, and bounded on the east by the boundary post of the village of Ranamusra, on the south by the post of the village of Ramasaida, on the west by the tope of Madhuka trees, and on the north by the post of the village of Bijauli : the sacred lands thus bounded with fields of *jádyā\** and lands and water comprised therein, and with right to make all present, past, and future collections from debtors. Knowing this, you should render unto him, in compliance with my orders, shares, usufructs and all other dues. No one must make any opposition to his enjoying these lands with all duties and all *Asavas*, sugarcanes, cotton, saffron, flax, mango, Madhuka (mowá) and other trees, as well as salt mines, and with all other things within the boundary, whether above or below the soil, and whether he enjoys the lands by himself cultivating them, or getting them cultivated by others, and whether he makes a gift of, or mortgages, or sells, them. This grant is irrevocable and interminable, and it should be so preserved by future sovereigns. Thus has it been said : 'This earth has been enjoyed by many kings including Sagara and others. To whomsoever belongs the earth for the time being, to him is due the fruit (of such gifts).' Written by Súḍha, the clerk of the edict department, and inscribed by the well-connected Jalpana."

*Transcript of an inscription from Parganah Augási, Bandá.*

- १ । स्वस्ति । जयत्याङ्गादयन्विश्वं विश्वेश्वरशिरोधृतः । चन्द्रान्वयनरेन्द्राणां वंश-  
श्चन्द्र इवोज्ज्वलः ॥ तत्र प्रव-
- २ । र्द्धमाने विशोभिः विजयभाजिष्णुजयशक्तिविजयशत्र्यादिवीराविर्भावभास्वरे  
परमभट्टारकमहारा-
- ३ । जाधिराजपरमेश्वरश्रीकीर्तिवर्मदेवपादानुध्यातपरमभट्टारकमहाराजाधि-  
राजपरमेश्वरश्रीष्ट-
- ४ । श्रीवर्मदेवपादानुध्यातपरमभट्टारकमहाराजाधिराजपरमेश्वरपरममाहेश्व-  
रकालञ्जराधिप-
- ५ । तिश्रीयुत्तमदन ‡ वर्मदेवो विजयी ॥ स एष दुर्विषहतरप्रतापतापितसकल-  
रिपुकुलः कुलवधूमिव वसुन्धरां निराकुलां प-

\* Probably Joari, *Serghaim joar*.

† विशोभि in the original.

‡ श्रीपत्तमदन in the original. The प is obviously an incorrect writing for य and the य त should be vocalised.



- ६ । रिपालयन्नविकलविवेकनिर्मलीकृतमतिः ॥ सूडलिविषयान्तःपातिरमूरडा-  
ग्रामोपगतान् कुटम्बिकायस्थमहत्तरा-
- ७ । दीन् सर्वान् समाज्ञापयति अस्तु वः संविदितं यथोपरि लिखितेऽस्मिन् ग्रामे  
हलदशाङ्केपि हल १० मत्कभूमिर्यत्र, वाउमेकोर-
- ८ । दे(?) द्रोणसार्द्धसप्त यत्राघाटाः पूर्वस्यां दिशि रणमुखारामदण्डकु । दक्षि-  
णस्यां दिशि कमाशैदायादण्डकु । पश्चिमायां दिशि मधुक-
- ९ । वृक्षवल्लीका । उत्तरे विजौलीग्रामदण्डकु एवं चतुराघाटविशुद्धा भूमिः  
जडिद्याक्षेत्रेण सह सजलस्थला सस्यावरजङ्ग-
- १० । मा साधमर्णभूतभविष्यद्वर्तमाननिःशेषादायसहिता चास्माभिर्भलस्वामिस-  
मीपावासे नवत्यधिकशतैकोपेतस-
- ११ । हस्ततमे संवत्सरे माघे मासि शुक्लपक्षे पूर्णिमायां सोमवारे अङ्कतोपि संवत्  
११६० माघसुदि १५ सोमे ॥ पुण्योदकेन विधिव-
- १२ । त् स्नात्वा देवादीन् सन्तर्प्य भास्करं भवानीपतिं चाभ्यर्च्य ऊतभुजि ऊत्वा  
मातापित्रोरात्मनश्च पुण्याय ढकारीग्रामविनिर्गताय वाज-
- १३ । सनेयशाखिने भरद्वाजगोत्राय । भरद्वाज । आङ्गिरस । वार्हस्पत्य । तृ-  
प्रवराय । वापनप्रपौत्राय । सान्तिपौत्राय । जाटपुत्राय ।
- १४ । गभन्तशर्मणे ब्राह्मणाय कुशलतापूतेन हस्तोदकेन स्वस्तिवाचनपूर्वं चन्द्रार्क-  
समकालं पुत्रपौत्राद्यन्वयानुगामित्वेन सम-
- १५ । लं कृत्वा दत्तेति मत्वा भवद्भिराज्ञाश्रयनविवेशैर्भूत्वा भागभोगादिकं सर्व-  
मस्मै समुपनेतव्यं तदेवास्य भूमिं सनिर्गमप्रच-
- १६ । यां ससर्वासनेक्षुकार्पासकुसुम्भशणाममधूकादिभूरुक्षां लवन(ण)खनिनिधा-  
नामपरैरपि सीमान्तर्गतैर्वस्तुभिः सहितां
- १७ । सवाह्याभ्यन्तरालायां भुञ्जानस्य कर्षतः कर्षयतो दानाधमनविक्रयं वा कुर्वतो  
न केनचित् काचिद्वाधा कर्त्तव्या उत चास्महा-
- १८ । नमनाच्छेद्यमनाहार्यश्चेति भाविभिरपि भूमिपालैः पालनीयमिति ॥ उक्तञ्च ॥  
वज्रभिर्वसुधा भुक्ता राजभिः सगरादिभिः ।
- १९ । यस्य यस्य यदा भूमिस्तस्य तस्य तदा फलं ॥ लिखितञ्च धर्मलेखिना श्रोस्व-  
ढेन उत्कीर्णञ्च विज्ञातिकाजल्पनेनेति ॥



*Recent Trans-Frontier Explorations, communicated by COL. J. T. WALKER,  
C. B., R. E., Surveyor-General of India.*

(With a Map.)

During the year 1876, the Mullá, one of the explorers attached to the Great Trigonometrical Survey, made a survey up the course of the Indus from the point where it enters the plains above Aṭak, to the point where it is joined by the river of Gilghit. All other portions of the course of the Indus—from the table-lands of Tibet, where it takes its rise, down to its junction with the ocean—have long since been surveyed; but up to the present time this portion has remained unexplored, and has been shown on our maps by a dotted line, the usual symbol for geographical vagueness and uncertainty. Here the great river traverses a distance of some 220 miles, descending from a height of about 5,000 feet to that of 1,200 feet above the level of the sea. Its way winds tortuously through great mountain ranges, whose peaks are rarely less than 15,000 feet in height and culminate in the Nanga-Parbat, the well-known mountain whose height, 26,620 feet, is only exceeded by a very few of the great peaks of the Himálayas. The river in many places is hemmed in so closely by these great ranges, that its valley is but a deep-cut, narrow gorge, and, as a rule, there is more of open space and culturable land in the lateral valleys, nestling between the spurs of the surrounding ranges, than in the principal valley itself.

The positions and heights of all the most commanding peaks in this region had been long fixed by Captain Carter's observations at trigonometrical stations on the British Frontier line; but no European has ever yet penetrated into it.\* Very difficult of access from all quarters, it is inhabited by a number of hill tribes, each independent and suspicious of the other, who are in a great measure separated and protected from each other by natural barriers and fastnesses. As a whole, the region has never been brought into subjection by any of the surrounding powers. Each community elects its own ruler, and has little intercourse with its neighbours; and with the outer world it only communicates through the medium of a few individuals who have the privilege of travelling over the country as traders. The Mullá possesses this privilege, and thus in the double capacity of trader and explorer, he traversed along the Indus, and through some of the lateral valleys, leaving the others for exploration hereafter.

\* Several itineraries which were obtained from native information are published in Dr. Leitner's Dardistán, and they have been combined together, with considerable ingenuity and very tolerable success, by Mr. Ravenstein, in a map published in the Geographical Magazine for August, 1875.



This work done, he proceeded, in accordance with his instructions, to Yásín, marching through the Gilghit Valley, but not surveying it, because the labours of the lamented Hayward, who was murdered at Yásín, already furnished us with a good map of that region. From Yásín he surveyed the southern route to Mastuj through the Ghizar and Sar Laspur Valleys; this has furnished an important rectification of a route which had hitherto been laid down from conjecture only, and very erroneously; for the road, instead of proceeding in a tolerably straight direction from Yásín to Mastuj, as was supposed, turns suddenly from south-west to north-north-east at Sar Laspur, which is situated at some distance to the south of the direct line, in a valley lying parallel to the valley of Chitral. At Mastuj the Mullá struck on to his survey of the route from Jalálábád, *viâ* Dir and Chitrál, to Sarhadd-i-Wakhán, in 1873, and then proceeded along that route towards the Baroghil Pass, as far as the junction of the Gazan with the Yarkun River, and then along the northern road from Mastuj to Yásín. This road turns up the Gazan Valley, crosses the Tui ar Moshabar Pass—which is conjectured to be probably not less than 16,000 feet in height—and, after traversing a deep crevassed glacier for a distance of about eight miles, reaches the point where the Tui River issues in great volume from the glacier; the road then follows the course of the river down to its junction with the Warchagam River, a few miles above Yásín.

Returning to Sar Laspur, the Mullá next surveyed the route to the south-west, up the valley leading to the Tal Pass. This pass is situated on a plateau of the range which connects the mountains on the western boundary of the valley of the Indus with those on the eastern boundary of the valley of Chitrál, and is generally known by the people of the country as the Kohistán. The sources and most of the principal affluents of the Swát and the Panjkorá rivers take their rise in this region, all the most commanding peaks of which were fixed by Captain Carter's triangulation; but of the general lie of the valleys relatively to the peaks, nothing at all definite has been known hitherto. The Mullá has done much to elucidate the geography of this region. On crossing the Tal plateau he descended into the Panjkorá Valley, and traversed its entire length down to Dodbab, at the junction of the Dir river with the Panjkorá, where he again struck on his route survey of 1873.

It would have been well if he could then have gone down the Panjkorá to its junction with the Swát River, but circumstances prevented him from doing so. He therefore travelled along the Havildar's route of 1868 as far as Miánkálai, and then surveyed the road to Nawágai and on to Pashat in the valley of Kunar; and finally, returning to Nawágái, he surveyed the road from there down to the British fort of Abazai.



Thus the explorations of the Mullá have added much to our knowledge of the geography of the interesting regions lying beyond our northern Trans-Indus Frontier. A good deal, however, still remains to be done before our knowledge of these regions is as full and complete as it should be, and every effort will be made to carry out further explorations as soon as possible.

The accompanying sketch map has been constructed to illustrate the Mullá's operations; it also shows the localities where more information is wanted. In the north-east corner the results of a recent reconnaissance of portions of the Karambar and the Nagar Valleys by Captain Biddulph are given, but somewhat modified from his map of the country.

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Notes on two ancient copper-plate Inscriptions found in the Hamírpúr District, N. W. P.—By V. A. SMITH, B.A., B.C.S. With a Note by PRÁNNÁTH PAṆḌIT, M.A., B.L.

In 1872, a peasant when ploughing in the lands of Mauza Nanyaurá, Parganah Panwári, Zila Hamírpúr, turned up two inscribed copper-plates. The plates were brought to Mr. W. Martin, C. S., who is now on furlough, and were left by him in the hands of a local paṇḍit (Muralidhar) who was in his service. With the assistance of this man, I have had Nágarí transcripts prepared, and have made translations of the inscriptions.

Plate No. I is 15 inches long by 11 inches broad, and is covered with an inscription of 19 lines, very well engraved and in good order. This record is interesting as throwing light on the chronology and order of succession of the Chandel kings. It tells us that Vidyádhara Deva was succeeded by Vijaya Pála Deva, and that the latter was succeeded by Deva Varmma Deva, lord of Kálinjar, who in 1107, Samvat, bestowed the lands to which the record relates. The statement that Vijaya Pála Deva succeeded Vidyádhara Deva is in accordance with the testimony of the Chhattarpur Mhau inscription, but that document gives Kírttí Varmma as the name of Vijaya Pála's son and successor, whereas my copper-plate instead of Kírttí Varmma names Deva Varmma Deva. Both inscriptions apparently refer to the same prince.

General Cunningham conjecturally assigns 1122 Samvat (1065 A. D.) as the date of the conclusion of Vijaya Pála's reign and the accession of Kírttí Varmma. Whatever was the name of Vijaya Pála's successor, it is clear from this copper-plate inscription that he had begun his reign previous to 1107, Samvat (1050 A. D.).

Plate No. II is 14 inches long by 8 inches broad, and has the edges turned up all round, so as to form a raised rim. The inscription is in 14 lines, and the letters have evidently been made with a punch, because their outlines are visible on the back of the plate. The writing is more crowded, and the characters more difficult to read than those in *Plate No. I*, but with the exception of one or two epithets which are unimportant to the general sense, I think my readings and translation are pretty complete and correct. I have not been able to make a facsimile. Like *No. I*, the document is a deed of gift of lands to a Bráhmaṇ. The donor is Rája Dhanga, and in accordance with the Khajuráho inscription, it is recorded that he was the son of Yaśo Varmma, who was the son of Haṛsha Deva. The date 1055 Samvat (998 A. D.) is written both in words and figures. The Khajuraho inscription which records Dhanga's self-sacrifice in the sacred waters of Prayág is dated 1056 Samvat; this copper-plate shows that he was still living in 1055 Samvat.

This record, therefore, adds but little to our knowledge of Chandel chronology, but it is of value as corroborating the evidence of the Khajuráho inscription, respecting the order of succession of the kings.

It is noticeable that the recipient of the grant recorded in this copper-plate is Rudra Srí Yaśodhara, a member of the Bháradwája *got*, which traced its descent from Angiras, Bháradwája and Várhaspatya: probably he was the same person as the Prime Minister Yaśodhara, mentioned in the Khajuráho record. The donee whose name is recorded in *Plate No. I*, belonged to the same family, and this is perhaps the reason why both inscriptions were found together.

I have not had an opportunity of visiting Mauza' Nanyaurá, but I am informed that an ancient Gaharwár tank exists there, and that there are also the remains of an old village site.

The present village is said to have been founded by one Noní Sáh Kurmí, and to be named after him.

Note.—Dhanga's name has been sometimes incorrectly written Banga, the mistake is evidently due to the similarity of the characters for *b* ब and for *dh* द in Kutila writing.

NO. 1. NANYAURÁ COPPER-PLATE.

Nágarí Transcript.

ॐ स्वस्ति । परमभट्टारकमहाराजाधिराजपरमेश्वरश्रीविद्याधरदेवपादानुध्यातपरम-
भट्टारकमहाराजाधिराजपरमेश्वरश्रीविजयपालदेवपादानुध्यातपरमभट्टारकमहाराजाधि-
राजपरमेश्वरपरममाहेश्वरश्रीकालंजराधिपतिश्रीमदेववर्मादेवः कुशली (1) । प्रतापानल-
कवल्लिताखिलदिकचक्रवालः । सङ्गामाङ्गणनिहतारातिवर्जितवैधवदानदीक्षागुहः । य

सत्येन युधिष्ठिरं विजयते त्यागेन चम्पाधिपं गाम्भीर्येण महोदधिं प्रभुतया देवं शचीवज्रभम् ।
रूपेणापि मनोभवं पटुतया शुक्रं सवाचस्पतिं तस्यान्यैर्विशदेन्दुधामधवलैः किं कीर्तितैः
स्याद्गुणैः (2) ॥ बुद्धिमान् धार्मिकः शूरः सत्यवादी जितेन्द्रियः । कृतज्ञः सज्जनानन्दज(न)नः
शुभदर्शनः ॥ इत्यमनेकगुणगणसमलंकृतशरीरः । निःसारसुन्दरतरालोककदलीगर्भविधमा-
कारसंसारमाकलय्य (3) सम्मत ११०० वैशाखमासे शुक्लपक्षे तृतीयायां सोमदिने सुहवास-
समावाये राजपुरावस्त्रायां रणमौलसम्बद्ध कठघैयामनिवासि महत्तमजनपदान् ब्राह्मणो-
त्तरान् राजपुरुषांश्च बोधयति (4) । आत्मीयमातुः राज्ञीश्रीभुवनदेव्याः साम्प्रत्यक्षरीके ।
जले विश्ववत्सला देवमनुष्यपूर्वान् विद्वन् सदभर्तितिलादकेन सन्तर्प्य रवेरर्घं दत्वा भगवन्तं
भवानीपतिं समभ्यर्च्य दद्यावत् कृतभुजि ऊत्ता च (5) । मातापित्रोरात्मनश्च पुण्यशोभि-
हृदये (6) । टकारी भट्टग्रामविनिर्गताय (7) भारद्वाजगोत्राय चंगिरस बार्हस्पत्य भार-
द्वाज चित्रवराय यजुर्वेदशास्त्रिणे ब्राह्मण अभिमन्यवे भट्टण्णापत्राय जयवरनपत्रे वेदवे-
दांगपारगाय षट्कर्माभिरताय सुशीलाय ग्रामोयमस्त्राभिः सजलस्थलः (8) साक्षमधूकः (9)
समर्त्तापरपाषाणः (10) सशैलवाहलः (11) सलोललवणाकरः (12) सवननिधानः (13)
चतुराघाटविशुद्धः (14) स्वामीमातृगुणपूतिगोचरपर्यन्तः (15) पूर्वदत्तदेवब्राह्मणवर्जितः (16)
सासनत्वेन प्रदत्तः । तद्भवद्विराज्जायवर्णविधेरैर्भूत्वा (17) समस्तभागभोगकरद्विरण्ण दण्डा-
दायादिकमुचितानुचितं (18) तस्योपनेतयं । सचन्द्रकलित्युदधि यावत् स्वपुत्रपौत्रसन्तत्या
भुनक्तु भोगेन वा प्रयच्छतु अन्यथा वा ददातु विक्रीणातु लपतु लषापयतु वा न कैरपि-
भाविभोक्तृभिः परिपन्थिभिर्भवितव्यं (19) । बडभिर्वसुधा भुक्ता राजभिः सगरादिभिः ।
यस्य यस्य यदा भूमिस्तस्य तस्य तदा फलम् ॥ (20) भूमिं यः प्रतिगृह्णाति यस्य भूमिं
प्रयच्छति । उभौ तौ पुण्यकर्माणौ निश्चतं स्वर्गगामिनौ ॥ (21) शंखं भद्रासनं इव वराद्याः
वरवाहनाः । भूमिदानस्य चिन्हानि फलं स्वर्गः पुरन्दर ॥ (22) स्वदत्तां परदत्तां वा यो
हरेत् वसुधरां । स विष्टायां क्षमिर्भूत्वा पिष्टभिः सद्य मज्जति ॥ (23) स्वर्णमेकं गामेकां
भूमेरप्येकमंगुलम् । हरद्वारकमायाति यावदाभूतसंभवम् ॥ (24) मंगलमहाश्रीः

श्रीमदेववर्मदेवः ।

Translation.

Om Svasti. The supreme master, *Mahārāja Adhirāja*, the supreme lord *Srī Vidyādhara Deva*, whose feet were adored by the supreme master *Mahārāja Adhirāja*, supreme lord, *Srī Vijaya Pāla Deva*, whose feet were adored by the supreme master, *Mahārāja Adhirāja*, supreme lord, the devout follower of *Mahesvara*, the lord of *Kālinjara*, *Srī Deva Varmma Deva* — may he prosper! The fire of his (*Deva Varmma's*) prowess devours the extremities of space; and he is the preceptor in the rite of giving widowhood to the wives of foemen slain in the arena of battle. Who by truthfulness conquers *Yudhisthira*; by munificence, the lord of *Champā* i. e., *Karna*; by depth, the great ocean; by sovereignty, the god beloved

of *Sachí*, i. e., *Indra*; by beauty too, over *Manobhava*; by eloquence, over *Sukra* with *Váchaspati*; what is the use of recounting his other qualities, white as the clear splendour of the moon? Wise, religious, valiant, truthful, subduer of his passions, grateful, the producer of the gladness of good men and of auspicious appearance. Thus his body (is) adorned with many qualities. Reckoning this world to be insubstantial (worthless), yet beautiful to look upon as the pith of a plantain tree; on Monday the third date of the black fort-night of the month of *Baisákha*, Samvat 1107 — — — — — (25) in *Rájapurávastá*, informs the principal inhabitants, of whom Bráhmaṇs are the foremost, of the village *Kothadai* attached to *Ranamaulla*, and all Royal officers. On the anniversary of the death of my mother, *Sri Bhuvana Deví*, Queen, having bathed in water according to sacred precept, having satiated the *Manes* of ancestors with *kusa*, *sesamum* and water, after satisfying gods and men, having presented an *Arghya* to the Sun, having duly worshipped the god, the lord of *Bhaváni*, i. e., *Shiva*, and having presented oblations in the fire, according to usage; For the increase of the virtue and fame of my parents and myself, to the Bráhmaṇa *Abhimanyu*, son of *Bhatta Ellá*, grandson of *Jayavara*, originally an inhabitant of *Takarí Bhatta Gráma*; a member of the *Bháradvāja gotra* and the triple *pravara* of *Angirasa*, *Brihaspati* and *Bháradvāja*, skilled in the *Vedas* and *Vedāngas*, engaged in the six acts proper for a Bráhmaṇ, and of excellent disposition—to him this village has been granted by us with its land and water, its mango and *mahua* trees, with its hollows, waste and stones, its rocks and tillage (?)—with its mines of metal and salt, with its forest and concealed treasure, with its clear defined boundary, with all grass, watering-places (?) and pastures for kine within its limits, excluding aught previously given to the gods or Bráhmaṇs, as a *Sásana*. Therefore, by you all complying with the orders (herein conveyed) all the rents in kind, taxes, gold payments, fines, hereditary rights and the rest should be made over to this person. Till the moon, sun and earth endure, he with his son, grandson and descendants should enjoy (the grant) or assign it, or give away to another, till it or cause it to be tilled, none who enjoy the kingdom after me, should prove an obstacle in the way. By many kings, *Sagara* and others, the earth has been enjoyed. Whosoever has been the land, his has been the fruit. He who accepts lands and he who grants lands, both these doers of virtuous deeds certainly go to Heaven. A Conch, a throne, an umbrella, fine horses and fine elephants, these mark the grant of lands; and the result is Heaven, O *Indra*! He who resumes land, whether given by himself or given by others, becomes a worm in filth and falls with his ancestors. By stealing a single *suverna*, a single cow, or even a finger-breadth of land, (the thief) remains in hell till the end of the Universe. Great prosperity. *Sri. Srimad Deva varmma Deva.*

No. 2. NANYAURÁ COPPER-PLATE.

Nāgarī Transliteration.

ओं स्वस्ति । आसीत्कल्पतरुः [कलौ] प्रणयिनामानन्दकन्दः सतां मित्राणां नयना-
मृतम्परवलस्यात्यन्तकेतुः परः । सेतुः सद्गुरुवारिधेर्भूमयतस्त्रैलोक्यचूडामणिः श्रीब्रह्मेन्द्रमुने-
र्महीयसि कुले श्रीदर्पदेवोन्मत्तः ॥ प्रचण्डमण्डलाग्रस्य करकान्तमहीभूतः । निदाघभा-
स्करस्यैव प्रतापो यस्य दुस्तुतः ॥ अरितिमिरनिकरवलभिदरिकरिकरयन्त्रमेदनकुठारः
तच्छीलतालयातस्तस्माज्जातोयशोवर्मा ॥ यस्येन्दुकुन्दशुभेण यशसा धवलीकृताः । कुलाचल-
गुहाः सेव्या जाताः किन्नरयोषिताम् ॥ तस्य श्रीधरदेवोभूत्पुत्रः पाचं जयत्रियः । असंख्य-
संख्यविख्यातः खड्गधारापराक्रमः ॥ चित्रं यदरिनारीणां हृदये विरहानलः । अजस-
मंशुपानीयसिच्यमानोपि वर्द्धते ॥ भद्रोन्नःपुरिकालकेषु सुरतक्रीडासु कण्ठपद्मः काठिन्यं
कुचयोर्भुवोः कुटिलता चन्द्रे कलङ्कस्थितिः । सुकृतिर्बलं कविवाचि कैरववने मित्रोदय
देपिता यस्मिन्नेकमहीपतौ कदलिकाकाण्डेषु निस्सारता ॥ परमभट्टारकमहाराजाधि-
राजपरमेश्वरश्रीश्रीदर्पदेवपादानुध्यात परमभट्टारकमहाराजाधिराजपरमेश्वरश्रीयशोवर्मा-
देवपादानुध्यातपरमभट्टारकमहाराजाधिराजपरमेश्वरश्रीकालंजराधिपतिश्रीधंगदेवः । स-
म्बत्सरसहस्रे पञ्चपञ्चाशदधिके कार्तिकपौर्णिमास्यां रविदिने एवं सम्बत् १०५५ कार्तिक-
सुदि १५ रवौ अष्टम्या(?)काशिकायां सैन्धवेयप्रदेशप्रवेशीकृतमण्डले । रोहिणीहृद-
यानन्दकन्दे हरिणलाञ्छने । भारद्वाजसंगोत्राय विप्रवराय भारद्वाज आंगिरस वार्हस्पत्य
वाजसनेयशाखिने तर्कयिकाविनिर्गमदूर्वाचरायामाभिजनाय रुद्रश्रीयशोधराय रुद्र-
जयकुमारसुताय ऊपरवाहप्रतिवर्द्धं सगलस्त्रलं सनिम्नोन्नत साधमधूकं समारोपरप्रख्यात
चतुःसीमापर्यन्तं । चण्डीनामधेयग्रामम् । हृदये पुण्ययशसोर्मातापित्रोरथात्मनः । यामपयास्य
चरितः स ददौ धर्मवत्सलः । दत्तादिदेश तत्रत्यान् जनाञ्जनपदप्रियः । भागभोगादिर-
ण्यादिप्रदानैः सुखमास्यताम् । ओं तथा स्मृतिकारैः । बडभिर्वसुधा भुक्ता राजभिः
सगरादिभिः । यस्य यस्य यदा भूमिस्तस्य तस्य तदा फलम् । भूमिं यः प्रतिगृह्णाति यश्च
भूमिं प्रयच्छति । उभौ तौ पुण्यकर्माणौ नियतौ स्वर्गगामिनौ ॥ गामेकां सुवर्णमेकं
भूमेरप्येकमङ्गलम् । हरन्नरकमायाति यावदाभूतमञ्जवम् ॥ इदं श्रीधरदेवस्य शासनं
शासनार्जितं । प्रतापतापितारातिचक्रस्य क्रमवर्तिनः ॥ श्रीधंग ।

Translation of the Inscription of the Nanyaurá Copper-plate, No. 2.

Om. It is well. Śrī Harsha Deva, the king, of the great family of Śrī Brahmendra Muni, was [as] the *kalpa vriksha* the root of joy to well-wishers, the water of immortality for the eyes of good friends, a very *ketu* in the destruction of hostile armies, a bridge in the surging sea of good men's burdens, the Jewel on the diadem of the three worlds, the sovereign whose hand dearly loved the sword, whose glory like that of the summer sun was insupportable. From that abode of generosity sprang Yaśo Varmma, a very Indra in the destruction of the dark hosts of (his)

enemies, an axe in cleaving the trunks of the elephants of (his) enemies, by whose radiance like the whiteness of the moon and jasmine were illuminated, the caves of *Kuláchala* frequented by the consorts of the *kinnaras*; his son was *Srí Dhanga Deva*, the favourite of the Goddess of Victory the prowess of whose blade's edge was famous in numberless battles. Wonderfully did he kindle in the hearts of the enemy's wives the flame of separation, which unceasingly spread, though besprinkled with the water of tears. [In his undivided reign] there was flight in the wavy curls [alone] of the denizens of the *antahpura*, in amorous dalliance [alone] there was seizure by the neck, in female breasts alone was hardness and brows [alone] were crooked, on the moon [only] were spots, and in the plantain tree [only] was saplessness: the poets spake well, and amidst clusters of the *Kairava* [*Nymphæa esculenta*] alone there was enmity at the rise of *Mitra* (meaning both Sun and friend). The king and sovereign lord *Harsha Deva*, the destroyer of the exultation of enemies, succeeded by the king and sovereign lord *Yaśo Varmma*, destroyer of the exultation of enemies, succeeded by the king and sovereign lord *Dhanga Deva*, destroyer of the exultation of enemies, ruler of *Kálinjar*, in the *Samvat* year 1055 at the full moon of *Kártik*, on Sunday the 15th day of the bright half of the month, to-day here in *Káśi*, when the orb [of the moon] which is a joy to the heart of *Rohiní*, and is marked with the form of a deer, was seized as a mouthful by the son of *Sinhiká* [*i. e.*, *Rahu*]
—to the member of the *Bháradvája* gotra, and the threefold *pravara* of *Bháradvája*, *Ángirasa* and *Várhaspatya*, belonging to the *Vajasaneya sákhá*, to him originally an inhabitant of *Turkáyiká* residing in the village of *Durbáhara*, named *Rudra Srí Yaśodbara*, the son of *Rudra Jaya Kumára*
—to him with its waste, streams and tanks, land and water, upland and lowland, and mango and *mahúá* trees, the village of *Chullí* bounded on the four sides by *Saśaroshara*—for the sake of increasing his own and his parent's merit, he the lover of religion gave— * * * *

* * * *, and having given the beloved of the people addressed those present saying—Remain happy by continuing to pay (the donee) rents in kind and in money and the rest. *Om.* So the writers of *Smritis* (have said): Many kings, *Ságar* and others, have enjoyed territory, so long as any retained his lands, so long has his been the fruit. He who receives land in gift, and he who bestows it, both these are meritorious and assuredly go to heaven. He who filches a single cow, a single gold-piece, or one finger's breadth of land, goes to hell till the end of all things. This is the decree of *Srí Dhanga* who is steadfast in the practice prescribed by the *Vedas* and whose ruling prowess pains the circle of his enemies. *Sri Dhanga.*

Note by Bábu Prannáth Pandit.

The Society is indebted to Mr. V. A. Smith, B. A., B. C. S., for these two copper-plates recording the grant of two villages by two kings of the Chandel Dynasty, *Dhanga Deva* and *Deva Varmma Deva* in Samvat 1055 and 1107 respectively. Mr. Smith has sent transcript and translation of both the plates, which I have revised for publication in the Society's Journal. Some parts of the translation however, specially of plate No. 2, remain tentative and far from literal. The Note appended by Mr. Smith gives the most salient points in the grants, and after the exhaustive notice in General Cunningham's *Archæological Survey of India*, Vol. II, there is nothing to be added to the ample materials which exist concerning the chronology of the Chandel Dynasty. I have added some philological parallels gathered from several grants, and those who care to pursue the matter further may consult the *Khajuráho* inscription in the *Asiatic Researches*, Vol. XII, and the *Ujjayini* grants in the *Transactions of the Royal Asiatic Society*. Vol. I, reprinted in *Colebrooke's Works*, Vol. II, and the *Banda* copper-plate, *ante* p. 73. The village *Tarkayiká*, of No. 2, is the same as the *Tokári* of No. 1, and the *Dhakári* of the *Banda* copper-plate, *ante* p. 76. All three may be safely identified with the *Tikrî* of modern maps.

NOTES.

(1.) Compare स च परमभट्टारकमहोशक्राधिराजपरमेश्वर श्रीवामदेवपादानु-
ध्यात, &c. in J. A. S. B. Vol. VIII, pp. 491, 492. Also स च परमभट्टारकमहा
(राजा)? धिराजपरमसाहेश्वरनिजभुजोपार्जित श्रीकाण्ठकुञ्जाधिपत्य श्रीचन्द्रदेवपादानु-
&c. in J. A. S. B., Vol. X, pp. 99, 100.

(2.) Compare the partly decyphered sloka तेजोभिरहस्करः करुणया
शैलेदनिः in the 9th line of the *Dhavalá* Inscription, J. A. S. B., Vol. X,
p. 820.

(3.) Compare तेनेदं विद्युच्चलमालोक्य शाश्वतं । J. A. S. B., Vol. VIII,
p. 297. The sloka संसारस्यासारतां दृष्ट्वा तथा हि । वाताभविभ्रममिदं, &c. in J. A.
S. B., Vol. V, p. 379.

(4.) Compare समस्त राजपुरुषान् ब्राह्मणोत्तरान् प्रतिनिवासिपट्टकिलजनपदा-
दीन् बोधयति । J. A. S. B., Vol. V, p. 379. राष्ट्रपति विषयपति ग्रामकूलाधिका-
रिकमहत्तरादीन् समनुबोधयति । J. A. S. B., Vol. VIII, p. 297. The royal
officers are set out in great detail in the *Kumbhi* grant. J. A. S. B. Vol.
VIII, p. 492, and in the *Fyzabad* grant. J. A. S. B. Vol. X, p. 100.

(5.) Compare स्नात्वा भगवन्तं भवानीपतिमभ्यर्च्य । J. A. S. B. Vol. V, p. 379.
नर्मदायां विधिवत् स्नात्वा श्रीमन्महादेवं समभ्यर्च्य । J. A. S. B. Vol. VIII, p. 492.
श्रीमद्वाराणस्यां गङ्गायां स्नात्वा विधिवन्मन्त्रदेवमुनिसनुजयुतपिष्टगणांस्तर्पयित्वा तिमिरपट-
लपाटलपटुमहसमुद्भरोच्चिदमुपस्थाप्यौषधिपतिसकलशेखरं समभ्यर्च्य विभुवनचातुर्भगवतो
वासु(दे)वस्य पूजां विधाय प्रचुरपायसेन हविषा हविर्भुजं कृत्वा । J. A. S. B. Vol. X,
p. 100.

(6.) Compare मातापित्रोरात्मनश्च पुण्यशोभिष्टब्धे । J. A. S. B. Vol. V, p. 379. आत्मनो धर्मायुर्वल्लविजयेत्यर्थविष्टब्धे इहामुत्र चितार्थमात्मानुग्रहाय । J. A. S. B. Vol. V, p. 729. मातापित्रोरात्मनश्च पुण्यशोभिष्टब्धे । J. A. S. B. Vol. VIII, p. 492. मातापित्रोरात्मनश्च पुण्यशोभिष्टब्धे । J. A. S. B. Vol. X, p. 100.

(7.) The phrase मुक्तावसुस्थानविनिर्गताय occurs in the Copper-plate grant of *Arjuna* (Samvat 1267) in J. A. S. B. Vol. V, p. 379 but has not been translated. A similar omission is noticeable concerning the adjective prefix श्रौचलभोविनिर्गत to the donee's name in the copper-plate grant of *Karka II* (Śaka 734) J. A. S. B. Vol. VIII, p. 297. The etymological signification of the word विनिर्गत is "gone out or from," but I suppose that in passages like the above, it is used to denote the original residence of the donee.

(8.) J. A. S. B. Vol. VIII, p. 492, Vol. X, p. 100.

(9.) These words occur in the copper-plate grant of *Ajaya Sinha Deva* (Samvat 932) J. A. S. B. Vol. VIII, p. 492, and have been translated into "mango trees and honey" (p. 486). Compare समधकासवाटिकाविटप- of the copper-plate grant of *Jayachandra* (Samvat 1243) J. A. S. B. Vol. X, p. 100, which has been correctly translated into "with gardens of *modhu* and mango trees" (p. 103). मधूक signifies the tree *Bassia latifolia*, and is never so far as I am aware used as a synonym for मधु, honey.

(10.) Compare सगनेषिर seemingly a mistake for सगर्तोषर in *Jayachandra's* copper-plate grant. J. A. S. B. p. 100, which has been translated at p. 103 into "with caves and fertile farms." ऊषर according to Wilson signifies saline soil. The phrase सगर्तोषरः in *Ajaya Siṃha's* copper-plate grant J. A. S. B. Vol. VIII, p. 492, where it is translated into "together with salt-pits."

(12.) Compare सलवणाकरः in J. A. S. B. Vol. VIII, p. 492. सलौहलवणाकरः in J. A. S. B. Vol. X, p. 100.

(13.) Compare सनिधिः सोपनिधिः in *Pravara Sena's* copper-plate grant. J. A. S. B. Vol. V, p. 729. सवनपर्वतः in *Ajaya Siṃha's* copper-plate grant. J. A. S. B. Vol. VIII, p. 492; and समिरिगहननिधानः in *Jayachandra's* copper-plate grant. J. A. S. B. Vol. X, p. 100.

(14.) Compare चतुराष्टाटनोपलक्षितः in the copper-plate grant of *Karka II*. J. A. S. B. Vol. VIII, p. 298. चतुराष्टाटविसर्गः in *Ajaya Siṃha's* copper-plate grant. J. A. S. B. Vol. VIII, p. 492 and सोर्द्धाधचतुराष्टाटविशुद्धः in *Jayachandra's* copper-plate grant. J. A. S. B. Vol. X, p. 100, the first half of which compound seems to have been omitted from the translation at p. 103. The words in the present plate may also be read as चतुःकङ्कटविशुद्ध. which synonymous expression also occurs in *Arjuna's* copper-plate grant, J. A. S. B. Vol. V, p. 379.

(15.) Compare सगोप्रचारः in *Ajaya Siṃha's* copper-plate grant. J. A. S. B. Vol. VIII, p. 492. दणायतिगोचरपर्यन्तः in *Jayachandra's* copper-plate

grant. J. A. S. B. Vol. X, p. 100, where it has been translated into "which extends as far as *Trinayuthi*." (p. 103).

(16.) This is the usual reservation about previous endowments. Compare पूर्वप्रदत्तदेवदायन्नदायरहितो in J. A. S. B. Vol. VIII, p. 298. देवत्राक्षण-भुक्तिवर्जम् Vol. V, p. 379.

(17.) Compare आज्ञाविधेयैर्भूत्वा in J. A. S. B. Vol. V, p. 379. आज्ञाविधेयोभूय in J. A. S. B. Vol. X, p. 100.

(18.) Compare यथा दीयमानभागभोगकरहिरणादिकं. J. A. S. B. Vol. V, p. 379, which is translated into "the full usufruct of all the rights and dues heretofore paid to Government," (p. 382). Also यथादीयमानकरकर-पूरनिकप्रभृतिनियतानियतसमस्त in J. A. S. B. Vol. X, p. 100 which is generally translated at p. 103 into "its revenues, as settled, or are to be settled."

(19.) Compare आचन्द्रादित्यकालीयः &c. in J. A. S. B. Vol. V, p. 729. सचन्द्रार्कवसन्तिर्वतसमकालीनः &c. in J. A. S. B. Vol. VIII, p. 298.

(20.) This *sloka* occurs amongst others in J. A. S. B. Vol. V, p. 379. Vol. VIII, pp. 298, 493. Vol. X, p. 100.

(21.) J. A. S. B. Vol. VIII, p. 494. Vol. X, p. 100.

(22.) Compare J. A. S. B. Vol. VIII, p. 494 where धराश्वा is a mistake for वराश्वाः, and Vol. X, p. 100.

(23.) J. A. S. B. Vol. V, p. 379. Vol. VIII, p. 493. Vol. X, p. 100. In *Pravara Sena's* copper-plate grant the latter half of the *slok* is different :

सद्वत्साम्परदत्तां वा यो हरेत् वसुधैराम् ।

गवां शतसहस्रस्य हन्तुर्हरति दुष्कृतमिति ॥ J. A. S. B. Vol. V, p. 729.

(24.) In this *sloka* सुवर्णं should be substituted for the sake of the metre for स्वर्णं. Compare J. A. S. B. Vol. VIII, p. 493.

(25.) The words in the original सुहवास समावाये seem distinct enough, but I am unable to attach any meaning to the compound.

The Antiquities of Bagurá (Bogra).—By H. BEVERIDGE, C. S.

Though Bagurá is almost a by-word among the Officers of Government for seclusion and dulness, yet like most places in this world it has attractions which only require unveiling. Perhaps to most Anglo-Indians, Bagurá is chiefly interesting, because it was the residence of Sir George Yule and the scene of many of his tiger-slaying exploits, but in reality the district has claims to attention of another and more enduring order. Foremost among these is the circumstance that it occupies an important place in the legendary and historical annals of Bengal. It is traversed from north to south by the sacred Karatoyá, which divides it into two nearly equal portions. This river has now dwindled into an insignificant stream, easily fordable in the cold weather and scarcely navigable except

in the height of the rains. But in old times, it was a great river, and formed the boundary between Bengal and Kámrúp. The western bank has apparently undergone little change. The old rampart, known as Bhím-jangal, still runs alongside of the western bank, and the ancient mound and fortification of Mahásthán continues to overhang the sacred bathing-place at Síla-dwíp; but on the east the appearance of the country has been greatly changed. The old river-bed has been nearly filled up, and long and wide churs, "made blithe by plough and harrow", now cover the channel up which the ships of the famous Chánd Saudágar used to sail.

Though no longer a territorial boundary, the Karatoyá is still remarkable for the demarcation which it makes between two distinct kinds of soil. On the west, Bagurá is a veritable land of Edom, the soil being almost as red as blood. It is at the same time so hard and tenacious, that ditches cut in it retain their sharpness of outline for years, and that the walls of the peasants' huts are almost invariably made of earth. The ant-hills so common on the edges of the fields testify to the peculiarity of the soil, for they stand up in sharp and many-pointed pinnacles and are like Adens in miniature. On the east of the Karatoyá, however, all is sand and alluvium, and the ryots have to construct the walls of their houses with reeds or mats. This difference of soil is said to affect the crime of the district; for burglaries are reported to be rare in the western thánás, as it is no easy matter for thieves to break through and steal, when the walls of the houses are so thick and hard as they are in the "Khíar" land. The etymology of the word Karatoyá is indicative of the antiquity and sanctity of the river. The name is derived from *kar* 'the hand' and *toyá* 'water', and is held to signify that the river was formed by the water which was poured on the hands of Siva, when he married the mountain-goddess Párvati.

I find also that there is the same tradition in Bagurá as in Maimansingh about the origin of the name Das-kahániá as applied to Sherpur. The Bagurá Sherpur is called Das-kahániá as well as the Maimansingh Sherpur, and the explanation given is, that the Karatoyá was once so broad that ten káhans had to be paid for crossing it. The explanation, however, does not seem a very probable one, for ten káhans means 12,800 kaurís, *i. e.*, one rupee, and I can hardly believe that any Bengali ever paid so much for crossing a river. It is just possible that the charge had reference not to the breadth of the river but to the fact that it separated two rival kingdoms. The charge may therefore have been in the nature of an embargo or an export-duty, and went for the most part into the pocket of the king or his representative, and not to the ferryman. It would be quite in accordance with the principles of native finance to levy such exorbitant duties on people leaving the country or taking merchandise abroad.

By the Hindus Bagurá is popularly identified with the country of king Virat, where the five Pándavas remained hidden for a year. Bagurá, they tell us, was the Dakshina Go-grih or southern cow-house (*Scotticè* byre) of king Virat, the northern one being in Ghorághát, *i. e.*, Aswasála. Bhím, they say, disguised himself as Virat's herdsman, and built the rampart known as Bhím's Jangal to make a pen for the cattle. So say the Paṇḍits, while the ryots improve the evidence got from this by pointing to the stone-pillar in the Badalgáchhi tháná and calling it Bhím's *pánti*, *i. e.*, Bhím's ox-goad. Additional corroboration is sought from the fact that there are villages in Bagurá, known by the names of Virat and Kichak (Virat's brother-in-law). Unfortunately, however, names of places are more likely to be the offspring of traditions than to be evidence of their genuineness, and even if the village of Kichak be old, it more probably derives its name from the wandering gypsies and robbers of the last century who were called Kichaks, than from the villain of the Mahábhárat.

A more convincing indication of the antiquity of Bagurá was obtained only last year when a tank was being dug in the middle of the town. The tank had been excavated to a considerable depth, when the workmen came on the top of a brick well. The well is still standing in the tank and may be seen by the curious. It is circular in form and solidly built with large, thin bricks which are so broad in proportion to their length as to be nearly square. The mode of building seems peculiar, for the bricks are arranged in layers which are alternately composed of flat and perpendicular bricks. The top now visible appears to me to be the real top of the well, and it is some fifteen feet below the present surface of the country. The remarkable thing is that the earth is not sand or chur-earth, but is solid, red soil. How the well came to be where it is, I cannot explain; but if the fifteen feet of earth were really gradually deposited above it, then the well must be many centuries old. Close to this tank, and only separated by the public road, there is an interesting proof of the antiquity of the soil in a magnificent Banyan tree. It is, I think, the finest tree I have seen next to that in the Botanical Gardens at Calcutta, and it is much more attractive than the latter, because it is still in the heyday of its career of beneficence. The Bagurá market is held under it and twice a week hundreds of men and cattle are sheltered by it from the sun and rain.

The real glory of Bagurá perhaps is the Badalgáchhi pillar which bears an inscription of the Pál Rájás, and which has been described by Sir Charles Wilkins and more recently by a native gentleman. I have never seen this pillar, and I hear that it is now so shrouded in jungle as to be almost inaccessible. As it is situated in the Government Estate of Jaipur, it is to be hoped that the authorities will look after its preservation. It is locally known as Bhím's *pánti* or ox-goad.

The most widely-known antiquity in Bagurá is Mahásthán, or the Great Place, which is situated seven miles north of the Civil Station. Mahásthán probably originally owed its importance to its being near a sacred bathing-place, and hence some have with a perverse ingenuity suggested that the true name is Mahásnán. Afterwards it became the habitation of a Kshatriya prince named Parasurám. Some traditions identify him with Parasuráma the destroyer of the Kshatriyas, though to do this, it is necessary to change his caste and make him a Bráhmaṇ. He was defeated and slain by a Muhammadan, named Muhammad Sháh Sultán, and probably it is this circumstance which has done most to perpetuate his fame. Muhammad Sháh Sultán is buried at Mahásthán, and his tomb is annually visited by thousands of pilgrims. There is no inscription on the tomb, and no one seems to know exactly who he was or where he came from. He bears the title of Máhi-suwár or fish-rider, and Hindus who swallow their own traditions wholesale, think they must rationalize this epithet by referring it to the figure head of the ship which brought the faqír. It is hardly worth while to do this when there are so many more marvels connected with him. The name Máhi-suwár probably has its origin in invention, pure and simple.

The only genuine inference which we can make, I think, from Muhammad Sháh's history is, that he was the hero of a popular rising. He was not a fighting man apparently, and is never called a Ghází, like the famous Ismá'il of Rangpúr. Parasurám was probably a bigoted tyrant, and was killed by those of his subjects who had turned Muhammadans. This view is supported by the local tradition that Parasurám could not bear the sight of a Musalmán. It seems also certain that Muhammad Sháh was helped by Parasurám's own subjects; for the tradition is, that one Harpál, the Rájá's sweeper, used to convey information to Muhammad Sháh of what was going on inside the palace. The sweeper's tomb is still pointed out on the mound of Mahásthán, and until Muhammadans got more puritanical, they used to make offerings at it of *sharáb* and *kabáb*, *i. e.*, meat and wine. Muhammad Sháh's tomb is in good preservation and is lighted up every night. It is surrounded by a wall, and close to the doorway there is a large stone Gauripát (not a lingam) lying on the ground. Mr. O'Donnell has described Mahásthán in the Asiatic Society's Journal for 1875, Part I, No. 2, but there are some errors in his account. As far as I can learn, the legend of the beautiful Síla Deví has its origin in a mispronunciation. The original name of the place is Síladwip, *i. e.*, the mound of stones, 'dwíp' in Bagurá being used to mean any high place and the epithet *Síla* being applied to this one on account of the large stones lying about on it. The populace, however, have lost sight of this meaning, and so started the tradition of Síla Deví. There is no flight of stairs at Síla Deví's Ghát, only

two old trees. The sacred part of the river extends over $2\frac{1}{2}$ reaches or about two miles, from Skand (a name of Siva) ghát to Gobindghát in the village of Gokul. The place called Síla Devi's ghát lies about half-way between the above gháts. An annual fair is held in the month of Chait, but the most sacred time is when the conjunction of the planets admits of the bathing's taking place in the month of Pús (Pús Náráyani).

Mr. O'Donnell speaks of the grant for the lákhiráj of Mahásthán having been confirmed in 1666 by the Governor of Dháká. In fact, however, the confirmation is dated 7th Jumáda I, 1096, A. H. (1st April, 1685) in the thirtieth year of the reign. I have seen the original *sanad*, which is in the Record-room at Bogra. The deed bears the seal of Kokultásh Muzaffar-Jang [Husain]. It is in the form of an order addressed to the officials of Silbaris in Sirkár Bázúhá, and directs them to respect the lákhiráj of the saint Muhammad Sulţán Mahí-suwar's Ástán. The word 'ástán' suggests to me the idea that Mahásthán may after all be a Muhammadan name meaning the Great Ástán. The Hindu name perhaps was Síladwíp. The place is also often called Mastángaṛh and under this name it appears in the Survey Map. I send a copy of the *Sanad* along with these remarks.* With regard to the resumption-proceedings, noted

* The following is a transcript of the copy of the *Sanad*—

• میر سید سلطان محمود ماہی سوار •

مقرر شد کہ متصدیان مہمات حال و استقبالی و چودھریان و قانون گوین
پرگنہ سیلابوس سرکار بازوہا بدانند چون بعرض رسید کہ بموجب فرمان والاہان
واسناد حکام سابق خادمی آستانہ مقدسہ سلطان العارفین حضرت و خارج
جمع مستان گزہ و زمین در پیچ ندی مشمولہ پرگنہ مذکور بسید محمد طاہر و سید
عبد الرحمان و سید محمد رضا با فرزندان بلا مشارکت غیرے مقرر است می باید کہ
مشار الیہم را خادم روضہ منورہ دانستہ مستان گزہ و اراضی مسطور را بمومی الیہم
وا گذارند کہ در ورثہ خودہا رسیدہ نزر و نیاز آستانہ مقدسہ و واصلات آنرا خرچ
خانقاہ واردان و صادران و صرف معشیت خودہا نمودہ بدعاگوئی دوام دولت
اشتغال میداشتہ باشند • درین باب قدغن دانند • تحریر بقاریخ ۷ شہر جمادی الاول
سنہ ۳۰ جلوس مطابق سنہ ۱۰۹۶ ہجری قلمی شد فقط •

پادشاہ

عالم گیر غازی

کوکلتاش

مظفر جنگ بہادر

by Mr. O'Donnell, I must in justice to our Government observe that no attempt was made to resume the whole tenure. All the land within the garh or fortification (some thousands of bighas apparently) was admitted to belong to the lákhirájdárs. The dispute was only about 300 bighas of chur-land which had formed between Mahásthán proper and the river-channel. The resumption-proceedings, however, must have been rather harassing to the proprietors; for they began in 1824, and did not end till December 1843. Síla Deví's Ghát is in this chur which was sought to be resumed, and this perhaps is enough to show the baselessness of the story about her, for clearly the chur was formed long after Mahásthán was made.

Translation.

It has been ordered that the Mutasaddís of all present and future matters of government, and the Chaudhurís, and Kánúngos of Pargana Sílbaris in Sirkár Bázúhá should bear in mind that, inasmuch as it has come to the knowledge of government that according to the *farmáns* and *sanads*, granted by former rulers, the service of the sacred shrine of the king of saints, Hazrat and income of Mastángarh and the land comprised within the bend of the river, in the said Pargana, have been settled on Sayyid Muhammad Táhir and on Sayyid 'Abdur-rahmán and on Sayyid Muhammad Razá and on their children, without anyone else being a partner, it is necessary that the above-mentioned persons should be looked upon as the servitors of the illuminated shrine, and that they should be left in possession of Mastángarh and of the above described lands, so that the lands may go down to their heirs; that they may perform the vows and prayers as usual at this holy shrine; that they may apply the income to defraying the expenditure of the religious house, on travellers, and on themselves for their own livelihood, so that they may occupy themselves with loyal prayers for the continuance of the present government. Every care is to be taken in this matter.

Written on the 7th Jumáda I, of the 30th year of the present reign, corresponding to the year of the Hijra 1096.

(Signed) Muzaffar Jang Bahádur, foster-brother (*kokultásh*) of 'Alamgír Pádsháh-i-Ghází.

It is impossible to reconcile the particulars given in the sanad copy with historical facts. First, the name should be Muzaffar Husáin not Muzaffar Jang. It is possible that the copyist mistook حسین for جنگ. Secondly, Muzaffar Husáin Kokultásh (also called Fidáí Khán A'zam Kokah, *kukah* being the same as *kokultásh*) was governor of Bengal from the middle of 1088 H., [A. D. 1677] *i. e.*, the 20th year of 'Alamgír, to the 9th (or 12th) Rabí II, 1089 (*i. e.*, the 21st year of 'Alamgír), when he died at Dháká.

But the 7th Jumáda I, 1096 [1685, A. D.] falls in the 28th year of 'Alamgír, whose 30th year commences with the 1st Ramazán 1097 [A. D. 1685].

The name of the saint is written at the top instead of in its proper place in the body of the deed, in order to do him honor. This is in accordance with Hindu customs, as may be seen in *sanads* for lands dedicated to an idol.

I could find nothing Buddhist at Mahásthán, and my impression is that Messrs. Westmacott and O'Donnell have been somewhat too ready to believe that Buddhism once prevailed in Bagurá. Bardankúti is a comparatively recent place, and has nothing to do, I think, with the Pandra Varddhana of the Chinese pilgrim. There are two statues at Mahásthán. One appears to be Basudeb (Krishna), and the other is simply a mermaid. It has no theological signification at all, I think, and is just a fantastic figure such as are common in Hindu palaces. The "right hand clenched," referred to by Mr. O'Donnell is, I think, a foot.

One curious remain at Mahásthán is a large brick well with rude stone steps leading down it. The steps are simply large stones jutting out from the brick work and look very awkward things to descend by. However I was told that many persons go down by them at the time of the fair. The well is called the Jiyat-kunḍ, or well of life, and the tradition is, that Parasurám for a long time got the better of Sháh Sultán, because when any Hindu soldier was killed, Parasurám revived him by sprinkling water from this well over him. The sweeper Harpál told Sháh Sultán of this, and then he destroyed the efficacy of the water by throwing pieces of beef into it. The fortification of Mahásthán is quadrangular in shape, and is popularly said to be two miles square. There are four openings in it, and these are pointed out as the gates. One is called the Támár Darwázah, because it is said to have been sheathed with copper. Outside the rampart there is on one side a large lake, called the Kálidohá Ságar. There are islands in it, and a promontory on its banks is called Bish-Mathan, because it is said that on it the goddesses Lutta and Padya mixed the poison which destroyed Chánd Saudágar's family. Chánd Saudágar is, as is well known, the impious merchant who would not worship Manesha, or the Lady of the Snakes. He is said to have lived at Chándmoa, *i. e.*, Chándmukh, near Mahásthán, and the foundations of the house he built for his son are still pointed out.

Another antiquity in Bagurá, the importance of which, however, is a good deal exaggerated by the people, is Jogir Bhaban, or the Ascetic's house. It lies some seven miles west of Bagurá. It appears to have been an early settlement of the Gosáins, or followers of Siva. The remains consist of some temples with elaborately carved wooden doors. One temple has the Bengali date 1089, and the name Meher Náth Sadak. One of the doors has the date 1119, and the name of Shukhal Náth Gosáin. There is one curious tomb with three monuments of different sizes. The largest is the guru's, the second is the disciple's, and the third and smallest is said to be that of the guru's dog ("his faithful dog shall bear him company"). There is a well of life here, too, but it is quadrangular in shape. The jogí in charge of the temples gave me a curious instance of faith. There are several images inside one temple, and the jogí candidly said that he

could not tell what god one of them represented. However, he said, as it was in the temple he accepted it and worshipped the unknown god. To the west of Jogir Bhaban, there are said to be the remains of the house of the Rájá Salbon (Sáliváhan?) and to the north of it, the remains of the house of the Rájá Sri Náth. Perhaps they were ancestors of Parasurám.

Returning to Mahásthán, I have to say that Parasurám was evidently a devoted worshipper of Siva. Indeed, he seems to have meditated setting up a rival to Banáras. In and about Mahásthán, there are places called Káshí, Brindában, and Mathurá.

In 1862, or thereabouts, a number of gold coins were found at Bámanpárá, near Mahásthán. The most of them have disappeared, but I have seen two, and have sent them to the Asiatic Society for identification. The records of the case which is said to have taken place about them have been destroyed. In 1874, a pot of old rupees was found in the village of Mahásthán by a labourer who was digging a ditch in a pán garden. The owners of the pán garden wrested the coins from him, and were convicted, rather harshly I think, of robbery and sentenced to six months' imprisonment. On appeal, their sentence was reduced to three months. Some of the coins were bought from the owners by Major Hume and were afterwards sent to the Asiatic Society. One coin was lying in the Magistrate's Máلكhánah, and has been sent by me to Professor H. Blochmann.* I have also sent down two other silver coins which are said to have been found at Mahásthán.

* The silver coins were described in Journal, Asiatic Society, Bengal, Part I, for 1875, p. 288. The coins now sent are five in number, viz., 2 gold coins, regarding which Dr. Rájendralála Mitra says:—"One of them, with the lion on the reverse, belongs to Mahendra Gupta, or as given on the margin of the obverse, Sri Mahendra Siñha; and the other to Chandra Gupta. Both have been figured in Thomas's Prinsep. The princes belong to the 2nd and 3rd centuries of the Christian era."

The three silver coins are—(1) a silver *tápkah* of Shams-uddín Ilyás Sháh of Bengal, as published by Thomas in his 'Initial Coinage of Bengal.'

(2.) A silver *tápkah*, struck in 862 H., by Mahmúd Sháh I, of Bengal as figured in this Journal, for 1875, Pl. XI, No. 7. The reverse is the same as in Nos. 5 and 8, but the reading is still doubtful.

(3.) A silver *tápkah* by the same king, of coarse manufacture, similar to Nos. 2 and 3, of Pl. XI, *loc. cit.*



1



2



3



4



5

ARIANS (DARDS) OF THE UPPER INDUS.

1. and 2. People of Dárchik Village. 3. A woman from Dáh. 4. A man from the Rüşen,
 or husbandman caste from Dáh. 5. A man from the Rüşmat or artisan caste from Dáh.
 (The caps worn are all black.)



FIG:1 BACTRIAN.

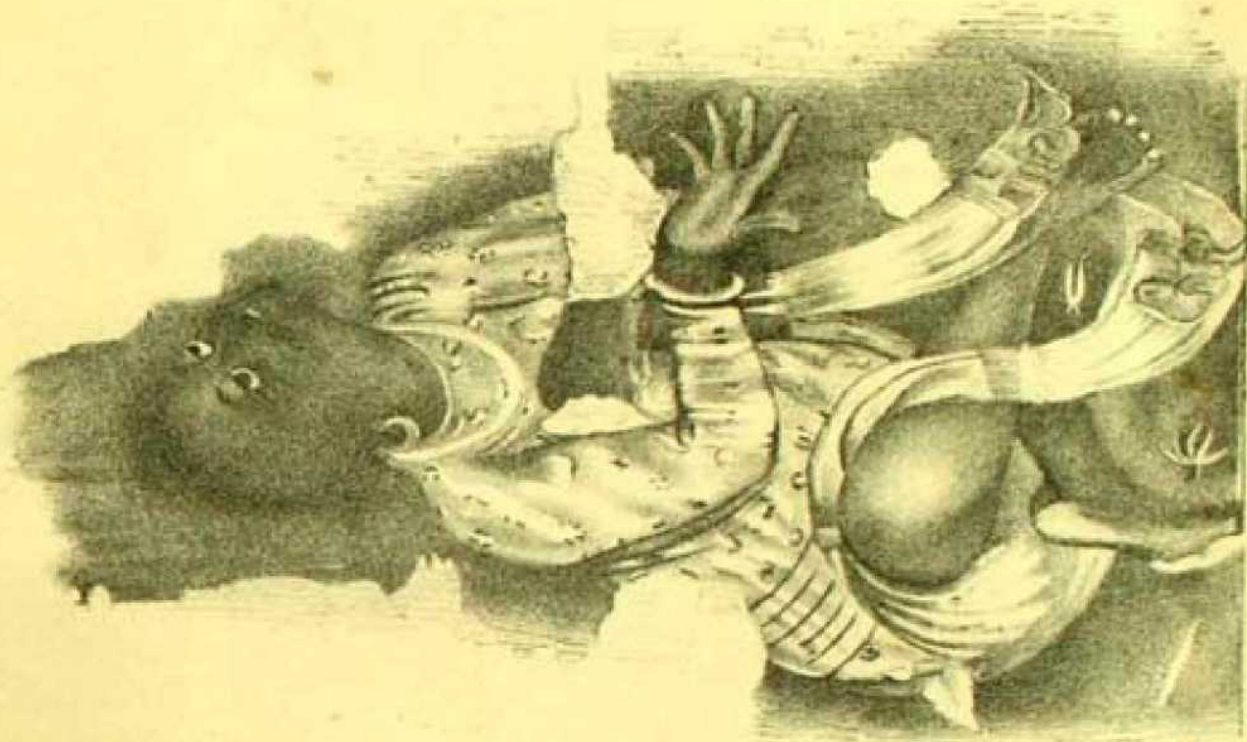


FIG:2. INDIAN.

[illegible]

Photomicrographed at the Surveyor General's Office, Calgary.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Part I.—HISTORY, LITERATURE, &c.

No. II.—1878.

Mathurá Notes.—By F. S. GROWSE, M. A. OXON., B. C. S.
(With eleven plates.)

The following scraps from my note-book have been hastily thrown together in the midst of the worry and confusion occasioned by my sudden and most unexpected transfer from a district, to which I had become greatly attached, and where I had confidently hoped to spend with much pleasure to myself and some slight advantage to the public the few years that yet remain of my career in the executive branch of the service. I cannot avoid this personal explanation, as it supplies the only adequate apology for the very unfinished state in which these fragments appear. I had intended to work up several of them into separate articles; but the opportunity of doing this has been denied me, and I have no choice but either to send them as they are, or else allow them to perish amidst the general wreck in which all my household gods are now involved.

1. *Gosáin Hari Vans of Brindaban, and the sect of the Rádhá Vallabhis.*

One of my inchoate projects was the compilation of a series of notices illustrating the life and doctrine of the different Vaishnava Reformers of the 16th and 17th centuries, who all made Brindaban their head centre. Though both the men themselves and their writings are scarcely known by name to European Orientalists, they have had an enormous influence on the tendencies of modern Hindu thought, and the sects which they founded still continue to gather converts from all parts of India. To last year's volume of the Society's Journal I contributed an article on Swámi Hari

Dás and his descendants, the Gosains of the temple of Bánke Bihári; and in the Introduction to the first Book of my translation of the *Rámáyana* I have given an account of Tulsi Dás, which I had intended to supplement, on the completion of the poem, with a disquisition on his theological system. But both translation and disquisition must now be indefinitely postponed; for a certain amount of quiet and composure is necessary for the adequate performance of so long and laborious an undertaking. I was under the impression that such a series, however dull and occasionally repulsive the separate articles might be, would still be of interest to the student and supply sound material, out of which to construct one short chapter at least in the great book of the future, the *History of Comparative Religion*. This project however is very summarily disposed of, since it is only at Mathurá that MSS. are obtainable, nor would the Gosáins communicate them to any one, in whom they had not by long intercourse acquired confidence: so suspicious are they of European interference. The language moreover in which the poems are written is not without difficulty and requires some special study, even on the part of natives, before it is readily intelligible. These are probably the reasons why Prof. Wilson in his '*Religious Sects*', is able to give very full and accurate accounts of the great teachers of earlier times, who wrote in Sanskrit, while his notices of the more modern schools are meagre and apparently, as a rule, not derived from original sources. Thus, though he devotes five pages to the Rádhá Vallabhis, he does not mention the name even of the Chaurási Pada, which is their great authority, and to illustrate their doctrine, translates a passage from the *Brahma Vaivarta Purána*, which is rather the standard of the Vallabhacháris, a different sect, who have their head quarters at Gokul.

The founder of the Rádhá Vallabhis was by name Hari Vans. His father, Vyása, was a Gaur Bráhmaṇ of Deva-ban in the Sabáranpur district, who had long been childless. He was in the service of the Emperor and on one occasion was attending him on the march from Agra, when at last his wife Tára gave birth to a son at the little village of Bád, near Mathurá, in the *sambat* year 1559. In grateful recognition of their answered prayers, the parents named the child after the god they had invoked, and called him Hari Vans, *i. e.*, Hari's issue. When he had grown up, he took to himself a wife, by name Rukmini, and had by her two sons and one daughter. Of the sons the elder, Mohan Chand, died childless; the descendants of the younger, Gopináth, are still at Deva-ban. After settling his daughter in marriage he determined to abandon the world and lead the life of an ascetic. With this resolution he set out alone on the road to Brindaban, and had reached Charthával, near Hodal, when there met him a Bráhmaṇ, who presented him with his two daughters and insisted upon his marrying them, on the strength of a divine command, which he said he had received

in a vision. He further gave him an image of Krishna with the title of Rádha Vallabh, which on his arrival at Brindaban was set up by Hari Vans in a temple that he founded between the Jugal and the Koliya Gháts on the bank of the Jamuná. Originally he had belonged to the Mádhváchárya Sampradaya and from them and the Nimbáraks, who also claim him, his doctrine and ritual were professedly derived. But in consequence of the mysterious incident, by which he had been induced to forego his intention of leading a celibate life and take to himself two new wives; or rather in consequence of his strong natural passions, which he was unable to suppress and therefore invented a fiction to excuse, his devotion was all directed not to Krishna himself, except in a very secondary degree, but to his fabled mistress Rádhá, whom he deified as the goddess of lust. So abominable a system was naturally viewed at first with no little amazement, as is clear from the language of the Bhakt Málá, which is as follows :

॥ मूल ॥

श्रीहरिवंसगुसांईभजनकी रीति सकृत् कोऊ जानि है ॥

श्रीराधाचरणप्रधान हृदै अति सुदृढ़ उपासी ।

कुंजकेलि दंपति तहांकी करत षवामी ॥

सर्वसुमहाप्रसाद प्रसिधिताके अधिकारी ।

विधि निषेध नहि दास अनन्य उत्कट व्रतधारी ॥

श्रीव्याससुवन पथ अनुसरै सोई भलैं पहिचानि है ।

श्रीहरिवंसगुसांईभजनकी रीति सकृत् कोऊ जानि है ॥

Translation of the text of Nábha Ji.

“The Gosáin Sri Hari Vans : who can understand all at once his method of devotion ? with whom the feet of blessed Rádhá were the highest object of worship ; a most staunch-souled devotee ; who made himself the page in waiting on the divine pair in their bower of love ; who gloried in the enjoyment of the remnants of all that was offered at their shrine ; a servant who never pleaded obligation or dispensation ; a votary of incomparable zeal. Account him blessed who follows in the path of Vyása's great son, the Gosáin Sri Hari Vans : who can understand all at once his method of devotion ?”

In the gloss, or supplement of Priya Dás, the same sentiment is expanded and a reference made to the legend of the Bráhmaṇ and his two daughters.

॥ टोका ॥

श्रीजूकी रीति कोऊ लाषनिमें एक जानें
 राधाई प्रधान मानें पाकें कृष्ण ध्यादये ।
 निपट विकट भाव होत न सुभाव असौ
 उनहीकी कृपादृष्टि नैकुकिहं पाईये ॥
 विधि औ निषेध छेद डारे प्रानप्यारे हियें
 जियें निज दास निस दिन वहै गाईये ।
 सुषद चरित्र सब रसिक विचित्र नीकें
 जानत प्रसिद्ध कहा कहिकै सुनाईये ॥
 आये यह त्यागि राग बन्धौ प्रिया प्रीतम सेां
 विप्र वडभाग हरिआज्ञा दई जानियें ।
 तेरी उभय सुता व्याहदेवो लेवो नाम मेरो
 उनको जो वंस प्रसंस जग मांनियें ॥
 ताही द्वार सेवा विस्तार निज भगतनिकी
 अगतनिकी गति सेा प्रसिद्ध पहिचानियें ।
 मांनि प्रिय बात यह गह्यो सुष लह्यो सब
 कह्यो कैसैं जात यह मनमें न आंनियें ॥
 राधिकावल्लभलाल आज्ञा सेा रसाल दई
 सेवा सेा प्रकास औ विलास कुंजधामको ।
 सेाई विस्तार सुषमार दृगरूप पियो
 दियो रसिक जिन लियो पहि वामको ॥
 निसि दिन गांन रस माधुरीको पान उर
 अंतर सिद्धान एक काम स्यामास्यामको ।

गुन सो अनूप कहि कैसेंके सरूप कहे
लहे मन मोद जैसे ओर नही नामको ॥

Translation.

"Would you know the one point in a thousand of Sri Hit Ji's ways? he adored Rádhá first and after her Krishna. A most strange and unnatural fashion, that none could even faintly comprehend save by his favour. He obliterated all distinction between obligation and dispensation; his Beloved was in his heart; he lived only as her servant, singing the praises of the divinity night and day. All the faithful know his many edifying and holy actions; why tell and repeat them since they are famous already.

"He left his home and came; his passion for Rádhá and Krishna had so grown: but you must know Hari had given an order to a wealthy Bráhmaṇ: 'Bestow your two daughters in marriage, taking my name, and know that their issue shall be famous throughout the world. By their means my worship shall spread among my faithful people, a path for the pathless, of high renown.' Obedient to the loving order he went home; the delight of all was past telling, for it was more than the mind could even conceive. Rádhá's dear spouse gave the gracious command: 'Publish abroad my worship and the delights of my sylvan abode.' He drank in with his very eyes the essence of bliss and gave it to every client who supported the cause of the female divinity. Night and day imbibing the honeyed draught of sweet song and cherishing it in his soul, with no thought but for Syámá and Syám. How is it possible to declare such incomparable merit? the soul is enraptured at the sound more than at that of any other name."

By his later wives he had two sons Ban Chand and Kishan Chand, of whom the latter built a temple to Rádhá Mohan, which is still in the possession of his descendants. The former was the ancestor of the present Gosáins of the temple of Rádhá Vallabh, the chief shrine of the sect. This was built by one of his disciples, a Káyath named Sundar Dás who held the appointment of Treasurer at Delhi. One of the pillars in the front gives the date as *sambat* 1683. An earlier inscription, of 1641, was noticed by Prof. Wilson, but this would seem to have been over the gateway leading into the outer court, which since then has fallen down and been removed. The temple is in itself a handsome building and is further of special architectural interest as the last example of the early eclectic style. The ground plan is much the same as in the temple of Haridev at Gobardhan (described in my *Mathurá Memoir*, Part I, page 172) and the work is of the same character, but carried out on a larger scale. The nave has an eastern façade, 34 feet broad which, as will be seen from the accom-

panying photograph, is in three stages, the upper and lower Hindu, and the one between them purely Muhammadan in character. The interior is a fine vaulted hall (63 ft. \times 20 ft.) with a double tier of openings north and south; those in the lower story having brackets and architraves and those above being Muhammadan arches, as in the middle story of the front. These latter open into a narrow gallery with small clerestory windows looking on to the street. Below, the three centre bays of the colonnade are open doorways, and the two at either end are occupied by the staircase that leads to the upper gallery. Some of the carved panels of the stone ceiling have fallen; but the outer roof, a steep gable, also of stone, is as yet perfect. Some trees however have taken root between the slabs and unless carefully removed must eventually destroy it. The actual shrine, or *cella*, as also at the temple of Gobind Deva, was demolished by Aurangzeb and only the plinth remains, upon which a room has been built, which is used as a kitchen. As no mosque was ever erected at Brindaban, it is not a little strange that Mr. Fergusson in his History of Indian architecture, when speaking of this very locality, should venture to say "It does not appear proven that the Moslems did wantonly throw down the temples of the Hindus, except when they wanted the materials for the erection of mosques or other buildings." A thorough repair of roof, eaves and east front would cost Rs. 4,500, and as a typical example of architecture, the building is worth the outlay. A modern temple has been erected on the south side, and the nave of the old fabric has long been entirely disused. In fact this is the last temple in the neighbourhood in which a nave was built at all. In the modern style it is so completely obsolete that its distinctive name even is forgotten. On the opposite side of the street is a monument to the founder, which however the present generation of Gosáins are too ungrateful to keep in repair. They are the descendants of Braj Chand's four sons, Sundar-Bar, Rádha Ballabh Dás, Braj-Bhúkhan and Nagar Bar Ji; and the heads of the four families so derived are now Daya Lál, Manohar Ballabh, Sundar Lál and the infant son of Kanhaiya Lál.

Hari Vans was himself the author of two poems; the one, the *Chaurási Pada*, or '84 Stanzas,' in Hindi, the other the *Rádha Sudhá Nidhi*, or 'Treasury of Rádha's Delights,' in 170 Sanskrit couplets. The latter, though not much read, is held in great esteem and, regarded solely as a piece of highly impassioned erotic verse, it is a spirited and poetic composition. There is a good Hindi commentary upon it by one Bansidhar, dated *sambat* 1820. It is written in a very florid style and its interminable compounds, to be rendered into intelligible English, would require a greater expenditure of time and thought than I can now bestow upon them. But as MSS. are scarce and Sanskritists may like to see a specimen of the text, I subjoin the first 25 and the last couplet in the original.

अथ राधासुधानिधिर्लिख्यते ॥

॥ श्लोकः ॥

यस्याः कदापि वसनाञ्जलखेलनोत्पद्यन्त्यातिधन्यपवनेन कृतार्थमानी ।
 योगीन्द्रदुर्गमगतिर्मधुसूदनोऽपि तस्या नमोऽस्तु वृषभानुभुवो दिशेऽपि ॥ १ ॥
 ब्रह्मेश्वरादिसुदुरूहपदारविन्दश्रीमत्परागपरमाहुतवैभवायाः ।
 सर्वार्थसाररसवर्षिकपार्द्रदृष्टेस्तस्या नमोऽस्तु वृषभानुभुवो महिम्ने ॥ २ ॥
 यो ब्रह्मरुद्रशुकनारदभीष्मसुखैरालक्षितो न सहसा पुरुषस्य तस्य ।
 सद्योवशीकरणचूर्णमनन्तशक्तिं तं राधिकाचरणरेणुमहं स्मरामि ॥ ३ ॥
 आधाय मूर्द्धनि यदापुरुदारगोप्यः कास्यं पदं प्रियगुणैरपि पिच्छमौलेः ।
 भावोत्सवेन भजतां रसकामधेनुं तं राधिकाचरणरेणुमहं स्मरामि ॥ ४ ॥
 दिव्यप्रमोदरससारनिजाङ्गसङ्गपीयूषवीचिनिचयैरभिषेचयन्ती ।
 कन्दर्पकोटिसरमूर्च्छितनन्दसुनुसञ्जीविनी जयति कापि त्रिकुञ्जदेवी ॥ ५ ॥
 तन्नः प्रतिल्लणचमत्कृतचारुलीलालावण्यमोहनमहामधुराङ्गभङ्गि ।
 राधाननं हि मधुराङ्गकलानिधानमाविर्भविष्यति कदा रससिन्धुसारम् ॥ ६ ॥
 यत्किङ्करीषु वज्रशः खलु काकुवाणी नित्यं परस्य पुरुषस्य शिखण्डमौलेः ।
 तस्याः कदा रसनिधेर्वृषभानुजायास्तत्केलिकुञ्जभवनाङ्गनमार्जनी स्याम् ॥ ७ ॥
 वृन्दानि सर्वमहतामपहाय दूराद्वृन्दाटवीमनुसर प्रणयेन चेतः ।
 सत्तारणीकृतसुभावसुधारसौधं राधाभिधानमिह दिव्यनिधानमस्ति ॥ ८ ॥
 केनापि नागरवरेण पदे निपत्य सम्प्रार्थितेकपरिरम्भरसोत्सवायाः ।
 सभ्रूविभङ्गमतिरङ्गनिधेः कदा ते श्रीराधिके नहि नहीति गिरः शृणोमि ॥ ९ ॥
 यत्पादपद्मनखचन्द्रमणिच्छटाया विस्फूर्जितं किमपि गोपवधूष्वदर्शि ।
 पूर्णानुरागरससागरसारमूर्त्तिः सा राधिका मयि कदापि दृष्टां करोतु ॥ १० ॥
 उज्जृम्भमानरसवारिनिधेस्तरङ्गैरङ्गैरिव प्रणयलोलविलोचनायाः ।

तस्याः कदानु भविता मयि पुण्यदृष्टिर्दृष्ट्वाटवीनवनिकुञ्जगृहाधिदेव्याः ॥ ११ ॥
वृन्दावनेश्वरि तवैव पदारविन्दं प्रेमानृतैकमकरन्दरसौघपूर्णं ।
हृद्यर्पितं मधुपतेः स्मरतापसुगं निर्वापयत्परमशीतलमाश्रयामि ॥ १२ ॥
राधाकरावचितपल्लववल्लीके राधापदाङ्गविलसन्मधुरस्थलीके ।
राधायशोमुखरमत्तखगावलीके राधाविहारविपिने रमतां मनो मे ॥ १३ ॥
कृष्णामृतं चल विगाढुमितीरिताहं तावत्सहस्र रजनी सखि यावदेति ।
इत्थं विहस्य वृषभानुसुते हि लप्स्ये मानं कदा रसदकेलिकदम्बजातं ॥ १४ ॥
पादाङ्गुलीनिहितदृष्टिमपत्रपिण्णुं दूरादुदीक्ष्य रसिकेन्द्रमुखेन्दुविम्बं ।
वीले चलत्पदगतिं चरिताभिरामां झङ्कारनूपुरवतीं वत कर्हि राधाम् ॥ १५ ॥
उज्जागरं रसिकनागरसङ्गरङ्गैः कुञ्जोदरे कृतवती नु सुदारजन्याम् ।
सुखापिता हि मधुनैव सुभोजिता त्वं राधे कदा स्वपिषि मत्करलालिताङ्घ्रिः ॥ १६ ॥
वैदग्ध्यसिन्धुरनुरागरसैकसिन्धुर्वात्सल्यसिन्धुरतिसान्द्ररूपैकसिन्धुः ।
लावण्यसिन्धुरमृच्छविरूपसिन्धुः श्रीराधिका स्फुरतु मे हृदि केलिसिन्धुः ॥ १७ ॥
दृष्ट्वैव चम्पकलतेव चमत्कृताङ्गी वेणुध्वनिं क्व च निशम्य च विह्वलाङ्गी ।
सा श्यामसुन्दरगुणैरनुगीयमानैः प्रीता परिखजतु मां वृषभानुपुत्री ॥ १८ ॥
श्रीराधिके सुरतरङ्गिनितम्बभागे काञ्चीकलापकलहंसकलानुलापैः ।
मञ्जीरसिञ्चितमधुव्रतगुञ्जिताङ्घ्रिपङ्केरुहैः शिशिरयस्त्र रसच्छटाभिः ॥ १९ ॥
श्रीराधिके सुरतरङ्गिणिदिव्यकेलिकल्लोलमालिनि लसद्ददनारविन्दे ।
श्यामामृताम्बुनिधिसङ्गमतीव्रवेगिन्यावर्त्तनाभिरुचिरे मम सन्निधेहि ॥ २० ॥
सत्प्रेमसिन्धुमकरन्दरसौघधारासारानजस्रमभितः स्ववदाश्रितेषु ।
श्रीराधिके तव कदा चरणारविन्दगोविन्दजीवनधनं शिरसा वहामि ॥ २१ ॥
सङ्केतकुञ्जमनु कुञ्जरमन्दगामिन्यादाय दिव्यमृदुचन्दनगन्धमाल्यम् ।
त्वां कामकेलिरभसेन कदा चलन्तीं राधे नु यामि पदवीमुपदर्शयन्ती ॥ २२ ॥

गत्वा कलिन्दतनयाविजनावतारमुद्धर्त्तयन्त्यमृतमङ्गमनङ्गजीवम् ।
 श्रीराधिके तव कदा नवनागरेन्द्रं पश्यामि मग्ननयनं स्थितमुच्चनीपे ॥ २३ ॥
 सत्प्रेमराशिसरसो विकसत्सरोजं स्वानन्दसिन्धुरससिन्धुविवर्द्धनेन्दुम् ।
 तच्छ्रीमुखं कुटिलकुन्तलभृङ्गजुष्टं श्रीराधिके तव कदा नु विलोकयिष्ये ॥ २४ ॥
 लावण्यसाररससारसुखैकसारे कारुण्यसारमधुरच्छविरूपसारे ।
 वैदग्ध्यसाररतिकेलिविलाससारे राधाभिधे मम मनोऽखिलसारसारे ॥ २५ ॥
 अद्भुतानन्दलोभश्चेन्नाम्ना रससुधानिधिः ।
 स्तवोऽयं कर्णकलशैर्गृहीत्वा पीयतां बुधाः ॥ १७० ॥

इति श्रीवृन्दावनेश्वरीचरणकृपामात्रविजृम्भितश्रीहितहरिवंशगोस्वामिना
 विरचिता श्रीराधारससुधानिधिः सम्पूर्णम् ॥ ० ॥

The Hindi poem, the *Chaurási Pada*, is much more popular and most of the Gosáins know at least some of its stanzas by heart. There is a commentary upon it by Lok-náth, dated *sambat* 1855, and another in verse, called the *Rahasya artha-nirúpana* by Rasik Lál, written in *sambat* 1734. Neither of the two, however, is of much assistance to the student ; all the simple passages being paraphrased with wearisome prolixity, while real difficulties are generally skipped. I subjoin the text and a translation of the first 12 stanzas.

अथ श्रीहितहरिवंशकृतवाणो लिख्यते ॥

राग विभास ॥

॥ १ ॥

जोड़ जोड़ प्यारो करै सोई मोहि भावै
 भावै मोहि जोड़ सोई सोई करै प्यारे ।
 मोकौं तो भावती ठौर प्यारेके नैननि मै
 प्यारो भयो चाहै मेरे नैननिके तारे ॥
 मेरै तो तन मनप्राणहं तैं प्रीतम प्रिय

अपने कोटिक प्राण प्रीतम मोसौँ हारे ।
जै श्रीहितहरिवंश हंसहंसिनी साँवल गौर
कहौ कौन करै जलतरंगनि न्यारे ॥

॥ २ ॥

प्यारे वाली भामिनी आजु नीकी जामिनी भेट नवीन मेघसौँ दामिनी ॥
मोँहन रसिकराइ री माई तामौँ जु मानु करै ऐसी कौन कामिनी ॥
जै श्रीहितहरिवंश अवन सुनत प्यारी राधिका रवनसौँ मिली गजगामिनी ॥

॥ ३ ॥

प्रातसमै दोऊ रस लंपट सुरत जुहु जैजुत अतिफूल ।
अमवारिज घन बिंदु वदनपर भूषन अंगहि अंग विकूल ॥
कछु रह्यो तिलक सिथल अलकावलि वदनकमल मानौँ अलिभूल ।
जै श्रीहितहरिवंश मदनरंग रंगि रहे नैन वैँन कटि सिथल दुकूल ॥

॥ ४ ॥

आजु तो जुवती तेरौ वदन आनंद भर्यौ पियके संगमके सूचत सुषचैन ।
आलस वलित बोल सुरंगरंगे कपोल विथकित अरुण उनीदे दोऊ नैन ॥
रुचिर तिलक लेस किरत कुसम केस मिर सीमंत भूषित मानौँ तैं न ।
करुणा करि उदार राषत कछू न सार दसन वसन लागत जव दैन ॥
काहेकौँ दुरति भीर पलटे प्रीतम चीर वसकिये स्याम सिधै सत मैँन ।
गलित उरसि माल सिथल किंकिनीजाल जै श्रीहितहरिवंश लतागटह सैन ॥

॥ ५ ॥

आजु प्रभात लतामंदिरमैँ सुष वरषत अति हरष जुगल वर ।
गौरस्याम अभिराम रंगरंगभरे लटकि लटकि पग धरत अवनि पर ॥
कुच कुमकुम रंजित मालावलि सुरतनाथ श्रीस्याम धामधर ।

प्रया प्रेमके अंक अलंकृत चिह्नत चतुरमिरोमणि निजु कर ।
दंपति अति अनुराग सुदित कल गान करत मन हरत परस्पर ॥
जै श्रीहितहरिवंश प्रसंस परायन गाइन अलि सुर देत मधुरतर ॥

॥ ६ ॥

कौन चतुर जुवती प्रिया जाहि मिलत लाल चोरकै रैन ।
दुरवति क्यौंच दुरै सुनि प्यारे रंगमै गहलै चैनमै नैन ॥
उर नषचंद विराने पट अटपटेसे वैन ।
जै श्रीहितहरिवंश रसिक राधापति प्रमथित मै न ॥

॥ ७ ॥

राग विलावल ॥

आजु निकुंजमंजुमै खेलत नवलकिशोर नवीन किशोरी ।
अति अनुपम अनुराग परस्पर सुनि अभूत भूतल पर जोरी ॥
विद्रुम फटिक विविधि निर्मित धर नवकर्पूरपराग न थोरी ।
कोमल किशलय सैन सुपेसल तापर स्याम निवेमित गोरी ॥
मिथुन हासि परिहासि परायन पीक कपोल कमल पर झोरी ।
गौर स्याम भुज कलह मनोहर नीवी बंधन मोचत डोरी ॥
हरिउर सुकर विलोकि अपुनपौ विभ्रम विकल मानजुत भोरी ।
चिवुक सुचारु प्रलोद प्रबोधित पिय प्रतिबिंब जनाइ निहोरी ॥
नेति नेति वचनामृत सुनि सुनि ललितादिक देषत दुरिचोरी ।
जै श्रीहितहरिवंश करत करधूनन प्रनय कोप मालावलि तोरी ॥

॥ ८ ॥

अतिंही अरुण तेरे नैन नलिन री ।
अलमजुत इतरात रगमगे भए निमिजागर मषिन मलिन री ॥

सिथल पलकमै उठत गोलकगति विधयौ मोहन मृग सकत चलि न री ।
जै श्रीहितहरिवंश हंसकलगामिन संभ्रम देत भँवरिनी अलीन री ॥

॥ ९ ॥

वनी राधा मोहनकी जोरी ।
इंद्रनीलमणि स्याम मनोहर सातकुंभ तन गोरी ॥
भाल विमाल तिलक हरि कामिनि चिकुरचंद विचरोरी ।
गज नादक प्रभु चाल गयंदनि गति वृषभानु किषोरी ॥
नील निचोल जुवति मोहन पटपीत अरुण सिर घोरी ।
जै श्रीहितहरिवंश रसिक राधापति सु रत रग मैँ वोरी ॥

॥ १० ॥

आजु नागरीकिशोर भाँवती विचित्र जोर
कहा कहैँ अंग अंग परममाधुरी ।
करत केलि कंठ मेलि वाज्जदंड गंड गंड
परस सरस रासलास मंडली जुरी ॥
स्यामसुंदरी विहार वाँसुरी मृदंग तार
मधुर घोष नूपुरादि किंकिनी चुरी ।
जै श्री देषति हरिवंश आलि निर्तनी सुगंध चालि
वारि फेरिदेति प्राण देह सौँ दुरी ॥

॥ ११ ॥

मंजुल कल कुंजदेस राधाहरि विशदवेश
राकानभ कुमदबंधु शरद जामिनी ।
स्यामलदुति कनकअंग विहरत मिलि एकसंग
नीरद मनी नील मध्य लसत दामिनी ॥

अरुन पीत नव दुकूल अनुपम अनुरागमूल
 सौरभजुत सीत अनिल मंदगामिनी ।
 किशलयदलरचित मैत्र वेलत पिय चाटु त्रै न
 मान सहित प्रतिपद प्रतिकूल कामिनी ॥
 मोहनमन मथत मार परसत कुच नीवी हार
 वेपथजुत नेति नेति वदत भामिनी ।
 नरवाहन प्रभुसुकेलि वज्र विधि भर भरत झेलि
 सौरतरसरूपनदी जगतपावनी ॥

॥ १२ ॥

चलहि राधिके सुजान तेरे हित सुषनिधान
 रासु रच्यो स्याम तट कलिंदनंदिनी ।
 निरत जुगवतीसमूह रागरंग अतिकटुह
 वाजत रसमूल मुरलिका अनंदिनी ॥
 वंसीवट निकट जहां परमरमणभुमि तहां
 सकलसुषद मलय वहै वायु मंदिनी ।
 जाती ईषदविकास कानन अतिसय सुवास
 राकानिस सरदमास विमल चांदिनी ॥
 नरवाहन प्रभु निहार लोचनभरि घोषनारि
 नषसिष सौंदर्य काम दुषनिकंदिनी ।
 विलसज्ज भुज ग्रीव मेलि भामिनि सुषसिंधु झेलि
 नव निकुंज स्याम केलि जगतवंदिनी ॥

Translation of the first twelve Stanzas of the Ohaurási Pada.

I. "Whatever my Beloved doeth is pleasing to me ; and whatever is pleasing to me, that my Beloved doeth. The place where I would be is in my Beloved's eyes ; and my Beloved would fain be the apple of my eyes.

My Love is dearer to me than body, soul, or life; and my Love would lose a thousand lives for me. Rejoice, Sri Hit Hari Vans! the loving pair, one dark, one fair, are like two cygnets; tell me who can separate wave from water?*

II. "O my Beloved, has the fair spoken? this is surely a beautiful night; the lightning is folded in the lusty cloud's embrace. O friend, where is the woman who could quarrel with so exquisite a prince of gallants? Rejoice, Sri Hit Hari Vans! dear Rádbiká hearkened with her ears and with voluptuous emotion joined in love's delights.†

III. "At day-break the wanton pair, crowned with victory in love's conflict, were all exuberant. On her face are frequent beads of labour's dew, and all the adornments of her person are in disarray, the paint-spot on her brow is all but effaced by heat, and the straggling curls upon her lotus face resemble roaming bees. (Rejoice, Sri Hit Hari Vans!) her eyes are red with love's colours and her voice and loins feeble and relaxed.

IV. "Your face, fair dame, to-day is full of joy, betokening your happiness and delight in the intercourse with your Beloved. Your voice is languid and tremulous, your cheeks aflame, and both your weary eyes are red with sleeplessness; your pretty *tilak* half effaced, the flowers on your head faded, and the parting of your hair as if you had never made it at all. The Bountiful one of his grace refused you no boon, as you coyly took the hem of your robe between your teeth. Why shrink away so demurely? you have changed clothes with your Beloved, and the dark-hued swain has subdued you as completely as though he had been tutored by a hundred Loves. The garland on his breast is faded, the clasp of his waist-belt loose (Rejoice, Sri Hit Hari Vans!) as he comes from his couch in the bower.

V. "To-day at dawn there was a shower of rapture in the bower, where the happy pair were delighting themselves, one dark, one fair, bright with all gay colours, as she tripped with dainty foot upon the floor. Great Syám, the glorious lord of love, had his flower wreath stained with the saffron dye of her breasts, and was embellished with the scratches of his darling's nails; she too was marked by the hands of her jewel of lovers. The happy pair in an ecstasy of affection make sweet song, stealing each other's heart (Rejoice, Sri Hit Hari Vans!) the bard is fain to praise, but the drone of a bee is as good as his ineffectual rhyme.

* That is to say: it is nothing strange that Rádhá and Krishna should take such mutual delight in one another, since they are in fact one and are as inseparable as a wave and the water of which the wave is composed.

† The first line is a question put to Krishna by one of Rádhá's maids, asking him if her mistress had promised him an interview. The second line is a remark which she turns and makes to one of her own companions.

VI. "Who so clever, pretty damsel, whom her lover comes to meet, stealing through the night? Why shrink so coyly at my words? Your eyes are suffused and red with love's excitement, your bosom is marked with his nails, you are dressed in his clothes, and your voice is tremulous. (Rejoice, Sri Hit Hari Vans!) Rádhá's amorous lord has been mad with love.

VII. "To-day the lusty swain and blooming dame are sporting in their pleasant bower. O list! great and incomparable is the mutual affection of the happy pair, on the heavenly* plain of Brindaban. The ground gleams bright with coral and crystal and there is a strong odour of camphor. A dainty couch of soft leaves is spread, on which the dark groom and his fair bride recline, intent upon the joys and delights of dalliance, their lotus cheeks stained with red streaks of betel juice. There is a charming struggle between dark hands and fair to loose the string that binds her skirt. Beholding herself as in a mirror in the necklace on Hari's breast, the silly girl is troubled by delusion and begins to fret, till her lover wagging his pretty chin shews her that she has been looking only at her own shadow. Listening to her honeyed voice, as again and again she cries 'Nay, nay,' Lalitá and the others take a furtive peep (Rejoice, Sri Hit Hari Vans!) till tossing her hands in affected passion she snaps his jewelled necklet.

VIII. "Ah, red indeed are your lotus eyes, lazily languishing and inflamed by night-long watch, and their collyrium all faded. From your drooping eyelids shoots a glance like a bolt, that strikes your swain as it were a deer and he cannot stir. (Rejoice, Sri Hit Hari Vans!) O damsel voluptuous in motion as the swan, your eyes deceive even the wasps and bees.

IX. "Rádhá and Mohan are such a dainty pair, he dark and beautiful as the sapphire, she with body of golden lustre; Hari with a *tilak* on his broad forehead and the fair with a *roli* streak amidst the tresses of her hair: the lord like a stately elephant in gait and the daughter of Vrishabhánu like an elephant queen: the damsel in a blue vesture and Mohan in yellow with a red *khaur* on his forehead (Rejoice, Sri Hit Hari Vans!) Rádhá's amorous lord is dyed deep with love's colours.

X. "To-day the damsel and her swain take delight in novel ways. What can I say? they are altogether exquisite in every limb; sporting together with arms about each other's neck and cheek to cheek, by such delicious contact making a circle of wanton delight. As they dance, the dark swain and the fair damsel, pipe and drum and cymbal blend in sweet concert with the tinkling of the bangles on her wrists and ankles and the girdle round her waist. Sri Hit Hari Vans, rejoicing at the sight of the damsels' dancing and their measured paces, tears his soul from his body and lays them both at their feet.

* *Abhūt*, not created, self-produced, divine.

XI. "The pavilion is a bright and charming spot ; Rádhá and Hari are in glistening attire and the full-orbed autumnal moon is resplendent in the heaven. The dark-hued swain and nymph of golden sheen, as they toy together, shew like the lightning's flash and sombre cloud. In saffron vesture he and she in scarlet ; their affection deep beyond compare ; and the air, cool, soft and laden with perfumes. Their couch is made of leaves and blossoms and he woos her in dulcet tones, while coyly the fair one repulses his every advance. Love tortures Mohan's soul, as he touches her bosom, or waist-band, or wreath, and timorously she cries 'off off.' Pleasant is the sporting of the glorious lord, close-locked in oft-repeated embrace, and like an earth-reviving river is the flood of his passion.

XII. "Come Rádhá, you knowing one, your paragon of lovers has started a dance on the bank of the Jamuna's stream. Bevy of damsels are dancing in all the abandonment of delight ; the joyous pipe gives forth a stirring sound. Near the Bansi-baṭ, a sweetly pretty spot, where the spicy air breathes with delicious softness, where the half-opened jasmine fills the world with overpowering fragrance, beneath the clear radiance of the autumnal full moon, the milkmaids with raptured eyes are gazing on your glorious lord, all beautiful from head to foot, quick to remove love's every pain. Put your arms about his neck, fair dame, pride of the world, and lapped in the bosom of the Ocean of delight, disport yourself with Syám in his blooming bower."

If ever the language of the brothel was borrowed for temple use it has been so here. But, strange to say, the Gosáins, who accept as their Gospel these nauseous ravings of a morbid imagination, are for the most part highly respectable married men, who contrast rather favourably both in sobriety of life and intellectual acquirements with the professors of rival sects that are based on more reputable authorities. Several of them have a good knowledge of literary Hindi : but their proficiency in Sanskrit is not very high : the best informed among them being unable to resolve into its constituent elements and explain the not very recondite compound *sudurúha*, which will be found in the second stanza of the Rádhá-sudhá.

To indicate the fervour of his passionate love for his divine mistress, Hari Vans assumed the title of Hit Ji and is popularly better known by this name than by the one which he received from his parents. His most famous disciple was Vyás Ji of Orchha, of whom various legends are reported. On his first visit to the Swámi he found him busy cooking, but at once propounded some knotty theological problem. The sage without any hesitation solved the difficulty, but first threw away the whole of the food he had prepared, with the remark that no man could attend properly to two things at once. Vyás was so struck by this procedure that he then and there enrolled himself as his disciple, and in a short space of time conceived

such an affection for Brindaban that he was most reluctant to leave it, even to return to his wife and children. At last, however, he forced himself to go, but had not been with them long before he determined that they should themselves disown him, and accordingly he one day in their presence took and eat some food from a Bhangi's hand. After this act of social excommunication he was allowed to return to Brindaban, where he spent the remainder of his life and where his *samádih*, or tomb, is still to be seen.

Another disciple, Dhruva Dás, was a voluminous writer and composed as many as 42 poems, of which the following is a list: 1, Jív-dasá; 2, Baidgyán; 3, Man-siksha; 4, Brindaban-sat; 5, Bhakt-námávali; 6, Brihad-báman Purán; 7, Khyál Hulás; 8, Siddhánt Bichár; 9, Príti-chovani; 10, Anandashtak; 11, Bhajanáshtak; 12, Bhajan-kundaliya; 13, Bhajan-sat; 14, Sringár-sat; 15, Man-sringár; 16, Hit-sringár; 17, Sabha-mandal; 18, Ras-muktávali; 19, Ras-hirávali; 20, Ras-ratnávali; 21, Premávali; 22, Sri Priyá Jí kí námávali; 23, Rahasya-manjari; 24, Sukhmanjari; 25, Rati-manjari; 26, Neh-manjari; 27, Ban-bihár; 28, Ras-bihár; 29, Rang-hulás; 30, Rang-bihár; 31, Rang-binod; 32, Ánand-dasa; 33, Rahasya-latá; 34, Ánand-latá; 35, Anurág-latá; 36, Prem-latá; 37, Ras-anand; 38, Jugal-dhyán; 39, Nirtya-bilás; 40, Dán-líla; 41, Mán-líla; 42, Braj-líla.

Other poems by different members of the same sect are the Sevak-báni and the Ballabh-rasik kí báni; the Guru-pratáp, by Dámodar Dás; the Hari-nám-mahimá, by Dámodar Swámi; the Sri Rúp Lál Ji ka ashtáka, by Hit Ballabh; and the Hari-nám-beli, the Sri Lál Ji badhai and the Sri Lárili Jú kí badhai by Brindaban Dás.

2. *The Chhatthi Pálná, or Assi Khamba, at Mahában.*

The description of this building given in my Mathurá Memoir, Part I, page 149, is not very accurate. The pillars of the colonnade are mostly, if not all, anterior in date to Máhmúd of Ghazní, and probably belonged to a temple, or it may be to several different temples of the Jaini faith, which he destroyed when he captured the fort in the year 1017. After they had been lying about for centuries, the Muhammadans in the reign of Aurangzib roughly put them together and set them up on the site of a modern Hindu temple that they had demolished. The building so constructed was used as a mosque till quite recent times, and its connection with Krishna, or his worship even, at any earlier period is entirely fictitious. That is to say, so far as concerns the actual fabric and the materials of which it is constructed: the site, as in so many other similar cases, has probably been associated with Hindu worship from very remote antiquity. In Sir John Strachey's time I obtained a grant of Rs. 1000 for the repair of the building, which had fallen into a very ruinous condition, and in digging the

foundations of the new screen-walls (the old walls had been simply set on the ground without any foundation at all) I came upon a number of remains of the true Hindu temple, dating apparently from about the year 1500 A. D. The Iconoclast would not use these sculptures in the construction of his mosque, since they had too recently formed part of an idolatrous shrine, but had them buried out of sight; while he had no scruple about utilizing the old Jaini pillars. Whatever I dug up, I either let into the wall or brought over to Mathurá for the local Museum, which in all probability will now never be instituted.

On a drum of one of the pillars is an inscription, which I read *Rám-dasa kas iknavi kam*, meaning, it would seem, 'Column No. 91, the gift of Rám Dás.' This is now upside down and from this fact as also from what has been said above, it may clearly be seen that my statement in the 'Memoir' that 'the pillars, as they now stand, occupy their original position' cannot be maintained. I still think, however, that in the main they represent the original design and that height was gained, from the first, by the simple expedient of placing one pillar on the top of another. For some of the inner columns are so carved, that they seem to be broken in two in the middle, though they are really each a single shaft.

3. *The Hindu sikhara ; its origin and development.*

If Mr. Fergusson had ever been able to visit Brindaban or to procure photographs of the temples there, it is possible that he would not have found the origin of the Hindu sikhara such an inscrutable mystery as he declares it to be. He conjectures that the external form may have been simply a structural necessity resulting from the employment internally of a very tall pointed horizontal arch, like that of the Treasury at Mycenæ. But so far as my experience extends, no such arch was ever used in a Hindu temple. On the contrary the *cella*, over which the sikhara is built, is separated from the more public part of the building by a solid wall pierced only by a doorway small enough to be easily closed; while the chamber itself is of no great height and is covered in with a vaulted ceiling, as to the shape of which nothing could be learnt from a view of the sikhara outside. And *vice versâ*. Thus at the great temple of Gobind Deva the central dome of the nave (or porch as Mr. Fergusson very inappropriately calls it) is perfect; but it is impossible to determine from thence with any certainty what would have been the outline and proportions of the tower that the architect proposed to raise over it. I have no question in my own mind that the origin of the sikhara is to be found in the Buddhist stúpa of which a representative example may be seen in Plate XIII sculptured at the back of a small pillar. Nor do I detect any violent break in the

development. The lower storey of the modern temple which, though most commonly square, is occasionally, as in the Madan Mohan example, an octagon and therefore a near approach to a circle, is represented by the masonry plinth of the relic-mound; the high curvilinear roof by the swelling contour of the earthen hill, and the pinnacle with its peculiar base by the Buddhist rails and umbrella on the top of a Dagoba. From the original stúpa to the temple of Parsvanáth at Khajraha, of the 11th century, the towers of Madan Mohan and Jugal Kishor at Brindaban of the 16th, and the temple of Vishveshvar at Banáras the gradation seems to be easy and continuous.

A description of the two Brindaban temples is given in the Journal for 1872 (pages 318-320), but it is only now that I have been able to get photographs taken of them.

4. *The temple of Gobind Deva at Brindaban.*

Mr. Fergusson in his *Indian Architecture* speaks of this temple as "one of the most interesting and elegant in India, and the only one perhaps, from which a European architect might borrow a few hints." I should myself have thought that 'solemn' or 'imposing' was a more appropriate term than 'elegant' for so massive a building, and that the suggestions that might be derived from its study were 'many' rather than 'few'; but the criticism is at all events in intention a complimentary one. It is, however, unfortunate that the author of a book, which will long and deservedly be accepted as an authority, was not able to obtain more satisfactory information regarding so notable a *chef d'oeuvre*. The ground-plan that he supplies is extremely incorrect: for it gives in faint lines, as if destroyed, the choir, or *jag-mohan*, which happens to be in more perfect preservation than any other part of the fabric, and it entirely omits the two chapels that flank the *cella* on either side and are integral portions of the design. The *cella* itself is also omitted; though for this there was more excuse, since it was razed to the ground by Aurangzib and not a vestige of it now remains beyond the rough rubble wall of the choir, to which it had been attached. The three towers, over the two side chapels and the dome in the centre of the nave, were certainly never erected. Those over the choir and the sacrarium were both finished, and of the former I annex a plan. Its restoration was completed last month, (March 1877) with the exception of the finial and a few stages below it, which had entirely perished, and which Sir John Strachey on that account would not allow me to replace, on the general principle that in all such cases the new work must be more or less conjectural and therefore untrustworthy.

As in the later temple of Rádhá Ballabh (described in the first section

of this article) the triforium is a reproduction of Muhammadan design, while the work both above and below it is purely Hindu.* It should be noted however that the arches in the middle story are decorative only, not structural: the spandrels in the head might be—and, as a fact, for the most part had been—struck out, leaving only the lintel supported on the straight jambs, without any injury to the stability of the building.

Its restoration was commenced in September 1873, and has been carried on under my supervision, without any professional assistance, up to the present time. The cost was estimated, in the D. P. W., at Rs. 1,32,387, but for the comparatively modest sum of Rs. 38,365 I have been able to accomplish almost all that was ever intended to be done. I had applied for a small supplementary grant of Rs. 3,642; but if it is sanctioned, there will be no one on the spot to see it expended.†

5. *The Sati Burj at Mathurá.*

This is a slender quadrangular tower of red sandstone which stands on the bank of the Jamuná, at the very heart of the modern city. It commemorates the Queen of Maharájá Bihár Mall of Jaypur, and was erected by her son, the Maharájá Bhagawán Dás, in the year 1570 A. D. The upper part, which had been destroyed long previously, was replaced about the beginning of the present century by an exceedingly ugly and incongruous plaster dome, which may help to preserve what remains of the original work, but quite destroys its architectural effect. The lower stories being also in a ruinous condition, I suggested to the reigning Maharájá that he should undertake its restoration as a family monument. It is not at all likely that the work will ever be set on foot; but the design that I had prepared for it may be deemed worthy of preservation. No small amount of time and thought was bestowed upon it, and I hope that architects will consider it both a pleasing object in itself and a probably faithful reproduction of the destroyed original.

* Thus eclecticism, which after all is only natural growth directed by local circumstances, has for centuries past been the predominant characteristic of Mathurá architecture. In most of the new works that I have taken in hand, and notably in the Catholic Church, which I had commenced and now have to leave unfinished, I have conformed to the *genius loci* and have shewn my recognition of its principles, not by a servile imitation of older examples, but rather by boldly modifying them in accordance with special requirements and so developing novel combinations.

† The grant has been sanctioned and the work is being carried on, under the supervision of the Executive Engineer in the Archaeological Department, by the same local agency and the same body of stone-masons that I had collected and organized,

6. *Mediæval Hindu columns from Sahár.*

Sahár is a small town in the Chhátá Pargana, which was of some importance last century as the favourite residence of Thákur Badan Sinh, the father of Súraj Mall the founder of the present Bharatpur dynasty. A short time ago a dispute arose between the Muhammadans and the Hindus as to the possession of a site on which they wished to erect, the one party a mosque, the other a temple. The real fact, as afterwards more clearly appeared, was that the Hindus had originally a temple there, which the Muhammadans had thrown down and built a mosque over it. This too had fallen and the ground had for some years remained unoccupied. The case when brought into Court was decided in favour of the Hindus, who thereupon set to work and commenced the erection of a shrine to be dedicated to Rádhá Ballabh. In digging the foundations, they came upon the remains of the old temple, which I rescued and brought into Mathurá. They consist of 10 large pillars or pilasters in very good preservation and elegantly carved with foliage and arabesques and also a number of mutilated capitals, bases, &c., the whole series proving an interesting illustration of the mediæval Hindu style of architecture. Their value is increased by the fact that two of the shafts bear inscriptions, in which the date is clearly given as *sambat* 1128 (1072 A. D.). With the exception of the date, I have not succeeded in reading much else; but the accompanying photograph* of one of them is on a scale large enough to be legible. The style that I call 'the mediæval Hindu,' and of which these pillars afford a good late example, began about the year 400 A. D. and continued to flourish over the whole of Upper India for more than seven centuries. It is distinguished by the constant employment in the capital, or upper half column, of two decorative features, the one being a flower-vase with foliage over-hanging the corners and the other a grotesque mask. The physiognomy of the latter is generally of a very un-Indian type, and the more so the further we go back, as is well illustrated by Plate 13, a photograph that Sir John Strachey was kind enough to send me of a pillar in the underground temple in the Allahabad Fort. The *motif* is precisely the same as may be seen in many European cinque cento arabesques, where a scroll pattern is worked up at the ends, or in the centre, into the semblance of a human face. The fashion with us certainly arose out of the classic *renaissance*, and in India also may possibly have been suggested by the reminiscence of a Greek design. But it was more probably of spontaneous and independent origin; as also it was among our Gothic architects, in whose works a similar style of decoration is not altogether unknown. In

* The base, shown in this photograph, is more than a thousand years older and belongs to the Indo-Scythian period. It has been used simply as a socket in which to imbed the pillar and so raise the inscription above the ground.

the earlier examples, such as that at Allahabad, the face is very clearly marked; though even there the hair of the head and the moustaches are worked off into a scroll or leaf pattern. In later work, of which numerous specimens may be seen in the accompanying illustrations of different dates ranging between the two limits fixed by the Allahabad pillar at the beginning and the Sahár columns at the end, the eyes are made so protuberant, and the other features so distorted and confused by the more elaborate treatment of the foliage and the introduction of other accessories that the proportions of a human face are almost and in some cases are altogether destroyed. The tradition however exists to the present day; and a Mathurá stone-mason, if told to carve a grotesque for a corbel or string-course of any building, will at once draw a design, in which are reproduced all the peculiarities of the old models.

7. *Miscellaneous Antiquities, Mathurá Museum.*

Plate No. 13 shews two Buddhist rails of early character. The one giving the representation of a *stúpa*, to which I have already referred, was brought from the *khera* of Jaysiñhpura, a village on the road between Mathurá and Brindaban. The other I dug out of one of the Chauwára mounds, where I found also a copper coin of Kanishka's reign. The columns with their bell-capitals surmounted by winged lions, and the miniature window-fronts or pediments, with which the architraves are decorated, illustrate the characteristic features of the architecture of the period. The upper group represents a sacred tree, enclosed in a railing, with two devotees worshipping it, the one having a wreath in his hand and the other a *chauri*. Below is an inscription in a single line ending with the word *dánam*, which records the name of the donor; but though most of the letters are clear, I cannot determine what the name is. The second group is probably a scene from one of the Játakas, to which the two birds will probably at some time give a clue.

Plate No. 14 shews a Buddhist rail, also of the Indo-Scythian period, of unusually large dimensions, the height of the stone, though a piece of it has been broken off at the bottom, being still 6 ft. 4 in. It is sculptured with a female figure, almost nude but for her metal ornaments, who carries a wicker-work umbrella, the stick of which is so long that it rests upon the ground. In the compartment above is a very curious bas-relief representing two monkeys and a bird, seated on basket-work chairs, with a hideously mis-shapen dwarf standing on the ground between them and apparently shedding tears.

In Plate 15 the two Buddhist rails placed on either side of the lowest range of sculptures are the same of which a back view is given in Plate 13.

The draped Buddha, which I rescued from the bed of the Jamuná at Jaysinhapura, is of early date and executed in a different style from most of those found in the neighbourhood. The arabesque pilaster next to it is a good specimen of the mediæval Hindu period. I found it in opening out the new paved way along the river bank in the city. The fragment of wall-decoration and the head are from the Kankáli tila, and the larger stone, covered with miniature temple façades of the same style as the caves at Karli and Ajanta, I brought from Mahában.

In the second tier (over an intermediate row of three Buddhist cross-bars) the small bas-relief, that occupies the place in the centre, is very curious. It represents a rustic wooden throne, with drapery thrown over it and a footstool set in front, and two attendants standing at the back, each with a *chauri* to keep off the flies. The object of veneration is a relic-casket, which is exposed upon the chair. Next to the pillar with the figure of Mayá Devi under the sál tree is a stone that I brought from Shergarh in the Chhátá Pargana, where I found it imbedded in one of the towers of a Fort built according to tradition by the Emperor Sher Sháh. It is the only example that I have seen in India of the use of the trefoiled circle as a decoration. It is the special characteristic of the architecture of Kashmír, a style which I am inclined to believe once spread much farther south, and was of purely Indian origin; while the later styles were modified more or less by Greek influences. The festoon is the same, as in the two flanking pillars (from the Kankáli tila) which I ascribe to about the year 400 A. D. the flower-vase being here used only, without the grotesque mask which was of somewhat later introduction. On the other side of the enthroned relic is what appears to be the spandril of a doorway with an outer border of grapes and vine leaves, and in the jamb the model of a triumphal pillar with bell-capital and winged lions and an elephant standing above the abacus. The upper portion of such a pillar with an inscription on the abacus, dated in the reign of Huvishka *sambat* 39, is also in the museum, and is figured by General Cunningham in volume III of his archaeological survey.

Of the two nude Jaina figures in the third tier, the one with the group of devotees below it, adoring the *chakra*, is of special interest on account of the inscription, which gives the date both in letters and figures as *sambat* 57. It would seem either that the century is omitted, or that some other era than that of Vikramáditya is intended: for the figure has rather a modern appearance, and the letters, which are very scratchy and ill-formed, are quite unlike the bold characters in the other inscriptions, when the king's name is given as well as the date and which are therefore known to be of the Indo-Scythian period.

In the upper tier, the female figure with a child in its lap (from the Manoharpur quarter of the city) is of exceptional character and uncertain date. The square box, with a seated Buddha fully draped, on each of the four sides, is shewn by the flanking columns to be of great antiquity. I brought it from the Mahávidya tila, which is unquestionably one of the oldest religious sites in Mathurá and probably has many relics of the past buried under the modern temple. The architrave, with defaced figure sculpture at either end, I found in the progress of the repairs of the Chhatthi Pálná at Mahában, being part of the Hindu temple there which was destroyed by Aurangzib. It is a good example of a simple but very effective style of decoration.

8. *The Festival of the Holi, as kept in Braj.*

In 1877 the Festival of the Holi fell unusually early in the year, while the weather was still cool enough to allow of a mid-day ride without serious inconvenience. I took advantage of the opportunity thus afforded me and made the round of the principal villages in the Chhátá and Kosi Parganas where the rejoicings of the Phúl Dol, for so these Hindu Saturnalia are popularly termed, are celebrated with any peculiar local observances, visiting each place on its special fête-day and jotting down what I saw in my note-book. Several of the usages are, I believe, entirely unknown beyond the limits of Braj, even to the people of the country, and—so far as I could ascertain by enquiries—they had never before been witnessed by any European. The following extracts from my diary may therefore be thought worthy of preservation.

Feb. 22nd, Barsána, the Rangila Holi.—In the middle of the town is a small open square, about which are grouped the stately mansions and temples built by the great families who resided here during the first half of the 18th century. I find a seat in the balcony over the gateway of the house still occupied by the impoverished descendants of the famous Katára, Rúp Rám, the founder of Barsána's short-lived magnificence, from which I have a full view of the humours of the crowd below. The cheeriness of the holiday-makers as they throng the narrow winding streets on their way to and from the central square, where they break up into groups of bright and ever varying combinations of colour; with the buffooneries of the village clowns and the grotesque dances of the lusty swains, who with castanets in hand, caricature in their movements the conventional graces of the Indian ballet-girl,

Crispum sub crotalo docta movere latus,

all make up a sufficiently amusing spectacle; but these are only interludes and accessories to the great event of the day. This is a sham fight between

the men from the neighbouring village of Nand-gánw and the Barsána ladies, the wives of the Gosáins of the temple of Lárli Ji, which stands high on the crest of the rock that overlooks the arena. The women have their mantles drawn down over their faces and are armed with long heavy bambus, with which they deal their opponents many shrewd blows on the head and shoulders. The latter defend themselves as best they can with round leather shields and stags' horns. As they dodge in and out amongst the crowd and now and again have their flight cut off and are driven back upon the band of excited viragoes, many laughable incidents occur. Not unfrequently blood is drawn, but an accident of the kind is regarded rather as an omen of good fortune, and has never been known to give rise to any ill-feeling. Whenever the fury of their female assailants appears to be subsiding, it is again excited by the men shouting at them snatches of the following ribald rhymes. They are not worth translation, since they consist of nothing but the repetition of the abusive word *sálá*, applied to every person and thing in Barsána. That town being the reputed home of Rádhá, the bride, its people are styled her brothers; while the Nand-gánw men account themselves the brothers of Krishna the bridegroom.

श्रीभांडवधाई वरसांनेकी ।

सब सारे वरसांनेवारे रावलवारे सारे ।

जगन्नाथके नाती सारे वे वरसांनेवारे ॥

लवानियां और कटारे सारे जे वरसांनेवारे ।

डोंम ढड़ेरे सबही सारे और पत्तरावारे ॥

बाग बगीचा सबही सारे सारे सींचनवारे ।

विरक्त और गुदरिया सारे लंबे सुतनावारे ॥

वावाजी भानों खरिसारे प्रेम सरोवरवारे ।

खाट खटोला सबही सारे चौका चूल्हे सारे ॥

अहलायत महलायत सारे सारे खंभतिहारे ।

अगवारे पिछवारे सारे गैल गिरारे सारे ॥

Feb. 23rd, Nand-gánw.—Another sham fight as on the preceding day, only with the characters reversed; the women on this occasion being the

wives of the Gosáins of the Nand-gánw temple, and their antagonists the men of Barsána. The combatants are drawn up more in battle-array, instead of skirmishing by twos and threes, and rally round a small yellow pennon that is carried in their midst; but the show is less picturesque in its accessories, being held on a very dusty spot outside the town, and was more of a phallic orgie.

Feb. 27th, the Holi. Phálen.—Here is a sacred pond called Prahlád-kund, and the fact of its having preserved its original name gives a clue, as in so many parallel cases, to the older form of the name now borne by the village. The local pandits would derive the word *Phálen* from the verb *phárna*, "to tear in pieces," with a reference to the fate of Prahlád's impious father, Hiranya-Kasipu: but such a formation would be contrary both to rule and to experience, and the word is beyond a doubt a corruption of Prahláda-gráma. Thus: 1st, the *r* in the compounds *pr* and *gr* is elided by Vararuchi's sūtra, *Sarvatra lava-rám*, III, 3, as in *kos* for *kros*; 2ndly, the *d* in *láda* is elided by Vararuchi II, 2, as in *pau* for *pada*; 3rdly, the initial *g* of *gáma* is elided by a further application of the last quoted rule; 4thly, the *m* in *gám* becomes *v*, these two letters being ordinarily interchangeable, thus *dhímar* = *dhívar*; *Bhamáni Bhaváni*; *gauna* = *gamana*; and 5thly, a nasal is inserted, which can always be done at pleasure. The result is Pahlau-aunw, from which to Phálan or Phálen is a transition so easy as to be almost a phonetic necessity.

Arriving at the village about an hour before sunset I found a crowd of some 5000 people closely packed in the narrow space on the margin of the pond and swarming over the tops of the houses and the branches of all the trees in the neighbourhood. A large bonfire had been stacked half-way between the pond and a little shrine dedicated to Prahlád, inside which the Khera-pat, or Pánda, who was to take the chief part in the performance of the day, was sitting telling his beads. At 6 p. m. the pile was lit and being composed of the most inflammable materials at once burst into such a tremendous blaze that I felt myself scorching, though the little hillock where I was seated was a good many yards away. However, the lads of the village kept on running close round it, jumping and dancing and brandishing their *lathis*, while the Pánda went down and dipped in the pond and then, with his dripping *pagri* and *dhuti* on, ran back and made a feint of passing through the fire. In reality he only jumped over the outermost verge of the smouldering ashes and then dashed into his cell again, much to the dissatisfaction of the spectators, who say that the former incumbent used to do it much more thoroughly. If on the next recurrence of the festival, the Pánda shews himself equally timid, the village proprietors threaten to eject him, as an impostor, from the land which he holds rent-free simply on the score of his being fire-proof.

Feb. 28th, Kosi.—After sitting a little while at a *nach* of the ordinary character given by one of the principal traders in the town, I went on to see the *chaupáis*, or more special Holi performances, got up by the different bodies of Ját zamindárs, each in their own quarter of the town. The dancers, exclusively men and boys, are all members of the proprietary clan and are all dressed alike in a very high-waisted full-skirted white robe, reaching to the ankles, called a *jhagá*, with a red *pagri*, in which is set at the back of the head a long tinsel plume, *Kalangí*, to represent the peacock feathers with which Krishna was wont to adorn himself as he rambled through the woods. The women stand at one end of the court-yard with their mantle drawn over their faces and holding long *lathis* with which at a later period of the proceedings they join in the Holi sports. Opposite them are the bands-men with drums, cymbals and timbrels and at their back other men with sticks and green twigs which they brandish about over their heads. The space in the middle is circled by torch-bearers and kept clear for the dancers, who are generally 6 in number, only one pair dancing at a time. Each performer, in the dress as above described, has a knife or dagger in his right hand and its scabbard in his left. At first darting forward they make a feint of thrusting at the women or other spectators and then pointing the knife to their own breast they whirl round and round, generally backwards, the pace growing faster and more furious and the clash of the band louder and louder till at last they sink down, with their flowing robe spread out all round them, in a sort of curtsy, and retire into the back ground to be succeeded by another pair of performers. After a pair of men comes a pair of boys, and so on alternately with very little variation in the action. Between the dances a verse or two of a song is sung, and at the end comes the *Holi khelna*. This is a very monotonous performance. The women stand in a line, their faces veiled, and each with a *lathi* ornamented with bands of metal and gaudy pendants, like the Bacchantes of old with the thyrsus, and an equal number of men oppose them at a few yards' interval. The latter advance slowly with a defiant air and continue shouting snatches of scurrilous song till they are close upon the women, who then thrust out their *lathis* and without uttering a word follow them as they turn their back and retreat to their original standing-place. Arrived there they let the women form again in line as they were at first and then again advance upon them, precisely as before, and so it goes on till their repertory of songs is exhausted or they have no voice left to sing them. To complete my description I here give some specimens of these *sákhis* or verses, and have added notes to all the words that seemed likely to require explanation. They are too coarse and at the same time too stupid to make it desirable for me to translate them.

हेली खेलनेके समयकी साखी ।

कान्हा धरे रे मुकट खेले हेरी ।

एक ओर खेले कुंवर कन्हैया एक ओर राधा गोरी ॥१॥

इन गलियन काम कहा तेरो ।

इन गलियन मेरो स्यालू* फासो में तो फाहंगी यार झगा† तेरो ॥२॥

खिमली तोहि देख अटाते ।

तू जु कहेहो तोहि अध्वर‡ लूंगो अब मेरी टूटी है बांह बराहेते ॥३॥

कव निकसेगो सुक्र॥ चले चालौ॥ ।

गोरीने डोला सजवायो रसियाने सिकल कसो भालो ॥४॥

जोरी** मत करे मान राख देंउगी ।

रंग महल मेरो पलंग बिछ्यो है झां तेरो जामा†† डाट लेंउगी ॥ ५ ॥

संग सोयवेको द्योस‡‡ कही होती ।

माटी खोदन गई खदाने§§ झां मेरी बांह गही होती ॥ ६ ॥

नजर ठेरारे|| नजर ठेरा ऊंचे चोड़े॥॥ पे यार ।

नजर ठेराय ऊंचे चोड़ेको॥॥ एक सुख देख्यो गाल अधर ले जाय ॥७॥

मोह धोय आई गाल*** कटादवे कू ॥८॥

* *Syālu*, a woman's *dopatta*.

† *Jhagá*, a man's dress.

‡ *Adhbar*, in the middle.

§ *Bardá*, an ornament worn by women on the elbow.

|| *Suk*, the planet Venus, which is regarded as auspicious.

¶ *Chálan*, the same as the more common *gauna*.

** *Jori*, for *zori*, *zabrdasti*.

†† *Jom*, lust, passion.

‡‡ *Dyaus*, the day-time.

§§ *Khadána*, a clay pit.

||| *Therá*, fix, for *thahra*.

¶¶ *Chonda*, the knot of hair at the top of a woman's head.

*** *Gál katána*, to have the cheek kissed.

खाज मिटे तेरी ॥ ८ ॥

साथिन तेरो गोना कहिये ।

गोनेमेंका फूल बटे हैं आंख मीच सहजैये ॥ १० ॥

मगन बेलीरे यार मगन बेली बनमें पायो यार मगन बेली ।

बड़ेसे भोंगरा*में पटक पकारी नारोंकी झटका खोली ॥ ११ ॥

March 1st, Kosi.—Spend an hour or two in the afternoon as a spectator of the Holi sports at the Gomati-Kund. Each of the 6 Ját villages of the Denda Pál§ has two or more *chaupáis*, which come up one after the other in a long procession, stopping at short intervals on the way to dance in the manner above described, but several at a time instead of in single pairs. One of the performers executed a *pas de seul* mounted on a *daf*, or large timbrel, which was supported on the shoulders of four other men of his troupe. Bands of Mummies (or *swángs*) were also to be seen, one set attired as Muhammadan fakirs; another (*gháyalon ká swáng*) as wounded warriors, painted with streaks, as it were of blood, and with sword-blades and daggers so bound on to their neck and arms and other parts of the body that they seemed to be transfixed by them. Some long iron rods were actually thrust through their protruded tongue and their cheeks, and in this ghastly guise and with drawn swords in their hands, with which they kept on dealing and parrying blows, the pair of combatants perambulated the crowd.

March 2nd.—At 2 P. M. ride over to Bathen for the Holanga mela, and find a place reserved for me on a raised terrace at the junction of four streets in the centre of the village. Every avenue was closely packed with the densest throng, and the house-tops seemed like gardens of flowers with the bright dresses of the women. Most of them were Játs by caste and wore their distinctive costume, a petticoat of coarse country stuff worked by their own hands with figures of birds, beasts and men of most grotesque design, and a mantle thickly sewn all over with discs of talc, which flash like mirrors in the sun and quite dazzle the sight. The performers in the *chaupái* could scarcely force their way through the crowd much less dance, but the noise of the band that followed close at their heels made up for all shortcomings. There was a great deal of singing, of a very vociferous and

* *Bhaungara*, a thicket.

† *Nára*, a twisted string, *izar-band*.

‡ *Jhatak*, a knot.

§ Any subdivision of a Ját clan is called a *Pál*, and the town of Kosi is the centre of one such subdivision, which is known as the Denda Pál.

probably also a very licentious character ; but my ears were not offended, for in the general din it was impossible to distinguish a single word. Handfuls of red powder (*abír*) mixed with tiny particles of glistening tale were thrown about, up to the balconies above and down on the heads of the people below, and seen through this atmosphere of coloured cloud, the frantic gestures of the throng, their white clothes and faces all stained with red and yellow patches, and the great timbrels with bunches of peacocks' feathers, artificial flowers and tinsel stars stuck in their rim, borne above the players' heads, and now and again tossed up high in the air, combined to form a curious and picturesque spectacle. After the music came a *posse* of rustics each bearing a rough jagged branch of the prickly acacia, stripped of its leaves, and in their centre one man with a small yellow pennon on a long staff, yellow being the colour appropriate to the Spring season and the god of Love. The whole party slowly made its way through the village to an open plain outside, where the crowd assembled cannot have numbered less than 15,000. Here a circular arena was cleared and about a hundred of the Bathen Játñis were drawn up in a line, each with a long bambu in her hands, and confronting them an equal number of the bow-men who are all from the neighbouring village of Jau. A sham fight ensued, the women trying to beat down the thorny bushes and force their way to the flag. A man or two got a cut in the face, but the most perfect good humour prevailed, except when an outsider from some other village attempted to join in the play ; he was at once hustled out with kicks and blows that meant mischief. The women were backed up by their own husbands, who stood behind and encouraged them by word, but did not move a hand to strike. When it was all over, many of the spectators ran into the arena, and rolled over and over in the dust, or streaked themselves with it on the forehead, taking it as the dust hallowed by the feet of Krishna and the Gopís.

The forenoon had been devoted to the recitation of Hindi poems appropriate to the occasion. I was not on the spot in time enough to hear any of this, but with some difficulty I obtained for a few days the loan of the volume that was used, and have copied from it three short pieces. The actual MS. is of no greater antiquity than 1776 A. D., the colophon at the end, in the curious mixture of Sanskrit and Hindi affected by village paṇḍits, standing thus :

Sambat 1852 Bhadrapad sudi 2 dwitiya, rabibar, likhitam idam pustakam, Sri Gopál Dás Charan-Pahári*-madhye parhan ártñi Sri Seva Dás Bañi Bathain vási :

* Charan-Pahári is the name of a small detached rock, of the same character as the Bharatpur range, that crops up above the ground in the village of Little Bathen.

but probably many successive copies have been made since the original was thumbed to pieces. The first stanzas which are rather prettily worded, are, or at least profess to be, the composition of the famous blind poet Súr Dás.

॥ पद ॥

तेरी गति जानी न परै करुणामै हो ।
 आगम अगम अगाधि अगोचर कैदबुधिविधिसचरै ॥
 अति प्रचंड बल पौरिषता मै केहरि भूष मरै ।
 अनाआस विन उद्दिम कियै अजगर पेट परै ॥
 कवडक बन डूबत पानीमै कवडक सिला तिरै ।
 वागरमै सागर करिडारै चडदिस नीर भरै ॥
 रीते भरै भरे फिरि डारै मैहरि करै तौ फेरि भरै ।
 पाहन बीच कमल परगासै जलमै अगिन जरै ॥
 राजा रंक रंकतै राजा लै सिरछत्र धरै ।
 सूर पतित तिरिजाय किनकमै जो प्रभु नैक डरै ॥

Translation.

"Thy ways are past knowing, full of compassion, Supreme Intelligence, unapproachable, unfathomable, beyond the cognizance of the senses, moving in fashion mysterious.

"A lion, most mighty in strength and courage, dies of hunger; a snake fills his belly without labour and without exertion.

"Now a straw sinks in the water, now a stone floats: he plants an ocean in the desert, a flood fills it all round.

"The empty is filled, the full is upset, by his grace it is filled again; the lotus blossoms from the rock and fire burns in the water.

"A king becomes a beggar and again a beggar a king, with umbrella over his head; even the guiltiest (says Súr Dás) in an instant is saved, if the Lord helps him the least."

The second piece, in a somewhat similar strain, is by Dámodar Dás.

॥ पद ॥

अरे मन भजिलै नंदलला ।
 यह बांननमै रह्यौ किन कोऊ पकरत नाहि पला ॥
 वेद पुरान संमृत यौ भाषौ याते नाहि भला ।
 दिनदिन बढ़त प्रताप चौगुनौ जैसैं चंद्रकला ॥
 काको धन काको यहसंपति काके सुतअवला ।
 दासोदर ककु थिर न रहैगो जगमै चलीचला ॥

Translation.

“Come, my soul, adore Nand-lala (*i. e.* Krishna) whether living in the house or in the woods (*i. e.* whether a man of the world or a hermit) there is no other help to lay hold of.

“The Veda, the Purānas and the Law declare that nothing is better than this; every day honour increases four-fold, like the moon in its degrees.

“Who has wealth? who has house and fortune? who has son and wife? says Dāmodar, nought will remain secure in the world, it is gone in a moment.”

The third piece, an encomium of the blooming Spring, is too simple to require any translation.

राग वसंत ॥

नवल वसंत नवल हंदावन नवलै फूलेफूल ।
 नवलै कान्ह नवल सब गोपी निरत एकैतूल ॥
 नवलै साष जवादि कुमकुमा नवलै वसन अमूल ।
 नवलै छीटवनीकेसरिकी भेटत मनमथसूल ॥
 नवल गुलाल उड़ै रंगवूका नवल पवनके झूल ।
 नवलहीं वाजे वाजैं श्रीभट कालिंदीकैं कूल ॥

The only divinities who are now popularly commemorated at the Holi Festival are Rādhā, Krishna and Balarāma; but its connection with them can only be of modern date. The institution of the Ban-jātra and the

Rás-lílá and all the local legends that they involve is traceable to one of the Brindaban Gosáins at the beginning of the 17th century A. D., viz. Náráyan Bhatt, a disciple of Krishan Dás, Brahmáchári, whom Sanátan, the leader of the Bengali Vaishnavas in Upper India, appointed the first Pujári of his temple of Madan Mohan. The fact, though studiously ignored by the Hindus of Mathurá, is distinctly stated in the Bhakt-málá, the work which they admit to be of paramount authority on such matters. But the scenes that I have described carry back the mind of the European spectator to a far earlier period and are clearly relics, perhaps the most unchanged that exist in any part of the world, of the primitive worship of the powers of nature on the return of Spring. Such were the old English merry-makings on May Day, and still more closely parallel the Phallic orgies of Imperial Rome as described by Juvenal. When I was listening to the din of the village band at Bathán, it appeared to be the very scene depicted in the lines—

Plangebant aliæ proceris tympana palmis,
Aut tereti tenuis tinnitus ære ciebant,
Multis raucisonos efflabant cornua bombos,
Barbaraque horribili stridebat tibia cantu.

Or again in the words of Catullus :

Leve tympanum remugit, cava cymbala recrepant,
Ubi sacra sancta acutis ululatibus agitant,
Quatiuntque terga tauri teneris cava digitis.

While the actors in the *chaupái*, with dagger in hand, recalled the pictures of the Corybantes or Phrygian priests of Cybele, the very persons to whom the poet refers. In Greece the Indian Holi found its equivalent in the Dionysia, when the phallus, the symbol of the fertility of nature, was borne in procession, as it now is here, and when it was thought a disgrace to remain sober. In like manner the Gosáins and other actors in the Indian show are quite as much inspired in their frenzied action by their copious preliminary libations as by the excitement of the scene and the barbarous music of the drums, cymbals and timbrels that accompany them.

Mathurá, April 6th, 1877.

POSTSCRIPT.

1. *Recent Archæological Discoveries.*

Since my transfer from the district, the mound adjoining the Magistrate's Court-house, which has often been explored before with valuable results, has been completely levelled as a Famine relief work. A large number of miscellaneous sculptures have been discovered, of which I have received no definite description. But the more prominent object is a life-size statue of Buddha, which is said to be very finely executed and also in

excellent preservation, though unfortunately it has been broken into two pieces by a fracture just above the ankles. On the base is an inscription in Pali characters, of which a transcript has been sent me by a clever native draughtsman. I decypher it as follows:—

“Deyadharmáyam Sákyabhikshu Yasa-dittasya. Yad atra punyam, tad bhavatu mātá-pitroh sukhá *rya páddhya yatam* cha sarvva-satv-ánuttara-jnána-váptaye.”

I have probably misread some of the letters printed in italics, for as they stand they yield no sense. (*Vide* Pl. XIX.) The remainder I translate as follows:

“This is the votive offering of the Buddhist monk Yasa-ditta. If there is any merit in it, may it work for the good of his father and mother and for the propagation of perfect knowledge throughout the world.”

In Sanskrit the primary meaning of *deya-dharma* is the duty of giving; but in Páli it ordinarily stands for ‘the gift’ itself. The literal signification of the monk’s name Yasa-ditta is ‘Resplendent with glory’; *ditta* being the Páli, Prákrit, or Hindi form of the Sanskrit *dīpta*, by a rule of Vararuchi’s, under which the example given is *sutta* (the modern *sotá*) for *suptá*. *Vápti*, ‘the propagation’ is from the root *vap*, to sow; from which also comes the Hindi word *báp*, ‘a father,’ like the Latin *sator*, from *sero*.

A second inscription of some length commences with the words *Mahá-rájasya Devaputrasya Huvishkasya Samvatsare 51 Hemanta masa 1 div.....* but I have not been able to read further, as the only transcript that I have received is a very imperfect one. A great number of fragmentary sculptures of different kinds have also, as I understand, been discovered, and some of them have been photographed for General Cunningham, who spent several days at Mathurá for the purpose of examining them. His account will doubtless appear in some future volume of his *Archæological Survey*.

Since Gen. Cunningham’s visit a third inscribed slab has been found. A transcript has been made and sent me and a facsimile of it is herewith given. I have not yet succeeded in decyphering it. It begins with the word *siddham*; then apparently followed the date, but unfortunately there is here a flaw in the stone. After the flaw is the word *etasya*.* The second line begins with the word *Bhagavat*. In the third line is the name *Ma-*

* The word following *etasya* begins with the letters *pu* the remainder being defaced, and was probably *purvaye*. This phrase *etasya purvaye* is of frequent occurrence in these inscriptions and is translated by Gen. Cunningham ‘on this very date’. I do not think it can bear such a meaning. It might be literally rendered ‘after this’; but it is really an expletive, like the Hindi *áge*, or occasionally the Sanskrit *tad-ananta-ram*, with which an Indian letter generally begins—after the stereotyped complimentary exordium—and which in the absence of full stops and capital letters serves to indicate a transition to a new subject.

thurá; at the end of the sixth line *mátapitroh*; in the middle of the seventh line *bhavatu sarva*.

2. *The Rádhá-sudhá-nidhi.*

The delay which has occurred in publishing these notes, enables me now to add a translation of the text of the Sanskrit poem of Hari Vans. It has been written at a considerable disadvantage, since here in Bulandshahr I am unable to consult the commentaries which I had borrowed at Mathurá. Even in this district there is, I find, at least one temple of the sect, at the town of Shikárpur.

Translation.

1. Hail to the home of Vrisha-bhánu's daughter, by whom once and again even Madhu-Súdan—whose ways are scarce intelligible to the greatest sages—was made happy, as she playfully raised the border of her robe and fanned him with its delicious breeze.

2. Hail to the majesty of Vrisha-bhánu's daughter, the holy dust of whose lotus feet, beyond the conception of Brahma, Siva and the other gods, is altogether supernaturally glorious, and whose glance moistened with compassion is like a shower of the refined essence of all good things.

3. I call to mind the dust of the feet of Rádhiká, a powder of infinite virtue, that incontinently and at once reduces to subjection the great power, that was beyond the ken even of Brahma, Rudra, Sukadeva, Nárada, Bhíshma and the other divine personages.

4. I call to mind the dust of the feet of Rádhiká, which the noble milk-maids placed upon their head and so attained an honour much desired by the votaries of the god with the peacock crest, dust that like the cow of heaven yields the fullness of enjoyment to all who worship with rapturous emotion.

5. Glory to the goddess of the bower, who with an embrace the quintessence of heavenly bliss, like a bountiful wave of ambrosia, sprinkled and restored to life the son of Nanda, swooning under the stroke of Love's thousand arrows.

6. When will there visit us that essence of the ocean of delight, the face of Rádhá, with sweet coy glances, bewildering us with the brilliancy of ever twinkling sportive play, a store-house of every element of embodied sweetness!

7. When shall I become the handmaid to sweep the court-yard of the bower of love for the all-blissful daughter of Vrisha-bhánu, among whose servants oft and again every day are heard the soft tones of the peacock-crested god?

8. O my soul, leave at a distance all the host of the great and affectionately hie to the woods of Brindaban; here Rádhá's name is as a flood

of nectar on the soul for the beatification of the pious, a store-house of all that is divine.

9. When shall I hear the voice of blessed Rádhá, that fountain of delights, crying 'Nay, nay,' with knitted brows, as some gallant suitor, fallen at her feet, begs for the rapturous joy of her embrace?

10. When, oh when will Rádhiká shew me favour, that incarnation of the fullness of the ocean of perfect love, the marvellous glory of the glistening splendour of whose lotus feet was seen among the herdsmen's wives?

11. When shall I attain to the blissful vision of the goddess of the blooming bowers of the woods of Brindaban, her eyes all tremulous with love, and the different members of her body like the waves of an overflowing ocean of delight?

12. O queen of Brindaban, I betake me to thy lotus feet, fraught with the honeyed flood of love's ambrosia, which, planted in Madhu-pati's heart, assuaged by their grateful coolness the fierce fever of desire.

13. Fain would my soul loiter in the woods sacred to Rádhá's loves, where the sprays of the creepers have been plucked by Rádhá's hands, where the fragrant soil blossoms with Rádhá's footprints, and where the frequent birds are madly garrulous with Rádhá's praises.

14. When, O daughter of Vrisha-bhānu, shall I experience the conceit induced by excess of voluptuous dalliance, I your handmaid, charged with the message, 'Come and enjoy Krishna's dainties,' and answered with the smile, 'Only stay, friend, till night comes.'

15. Ah! when shall I behold Rádhá, with downcast eyes, bashfully stealing a distant glance at the moon-like orb of the face of the lord of lovers, as she trips with twinkling feet, all graceful in her movements, to the music of her own bangles?

16. When, O Rádhá, will you fall asleep, while my hands caress your feet, after I have tenderly bathed you and fed you with sweet things, wearied with your vigil through a night of dalliance, in the inmost bower, in the delicious embrace of your paragon of lovers?

17. O that the ocean of wit, the singular ocean of love's delights, the ocean of tenderness, the ocean of exuberant pitifulness, the ocean of loveliness, the ocean of ambrosial beauty and grace, the ocean of wantonness, blessed Rádhiká, would manifest herself in my soul!

18. O that the daughter of Vrisha-bhānu, looking up all tremulous and glistening in every limb like the flowering *champa*, would clasp me in her arms, charmed by my chanted praises of Syám-sundar, as she listens for the sound of his pipe!

19. Blessed Rádhiká, cool me with the multiplicity of love, that breathes in the swan-like melody of the girdle that binds your loins red-

dened with dalliance, and in the tinkling of the bangles, like the buzzing of bees, clustered round your sweet lotus feet.

20. Blessed Rádhiká, wreathed with the surge of a Ganges wave of heavenly dalliance, with lovely lotus face and navel as a whirl in the stream, hastening on to the confluence with Krishna, that ocean of sweetness, draw near to me.

21. When, O blessed Rádhiká, shall I rest upon my head your lotus feet, Govinda's life and all, that ever rain down upon the faithful abundant torrents of the honeyed flood of the ocean of perfect love?

22. When, O Rádhá, stately as an elephant in gait, shall I accompany you to the bower of assignation, to shew the way, bearing divinely sweet sandal wood, and perfumes and spices, as you march in the excitement of love's rapture?

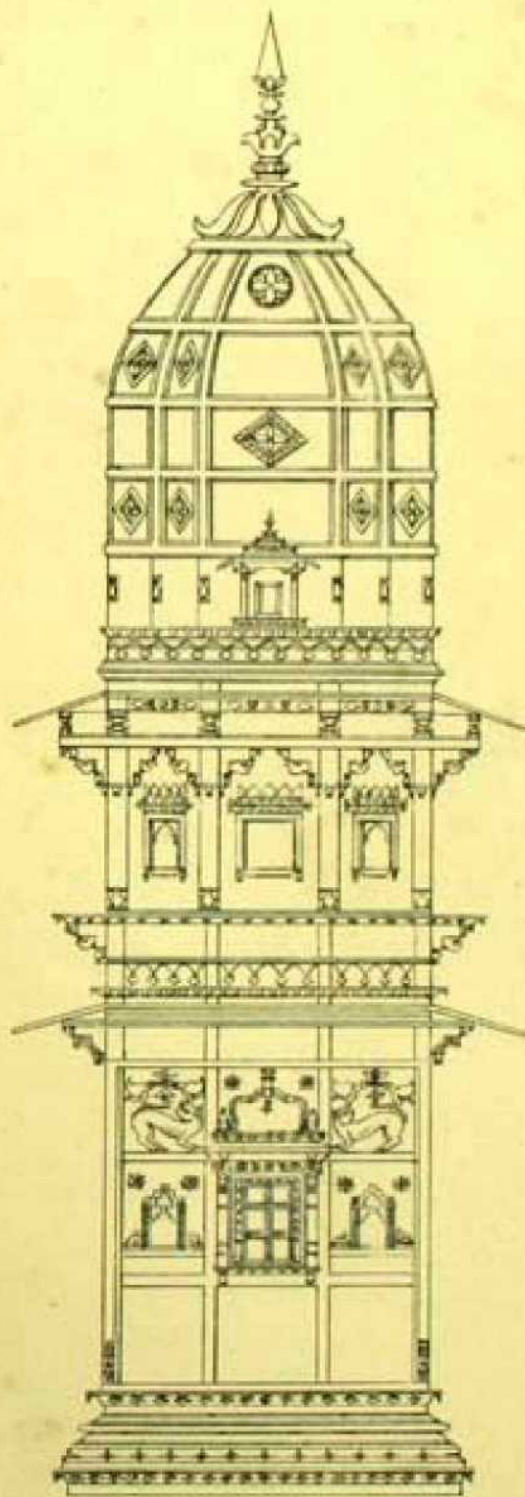
23. When, O blessed Rádhá, having gone to some secluded slope of the Jamuná and there rubbing with fragrant unguents your ambrosial limbs, the very life of Love, when shall I see your prince of lusty swains, with longing eyes, mounted on some high *kadamb* tree?

24. When, O blessed Rádhiká, shall I behold your heavenly face, clustered—as if with bees—with wanton curls, like some lotus blossoming in a lake of purest love, or a moon swelling an ocean of enjoyment, an ocean of delight.

25. Ah! the name of Rádhá, perfection of loveliness, perfection of delight, sole perfection of happiness, perfection of pity, perfection of honeyed beauty and grace, perfection of wit, perfection of the rapturous joys of love, perfection of all the most perfect that my soul can conceive!

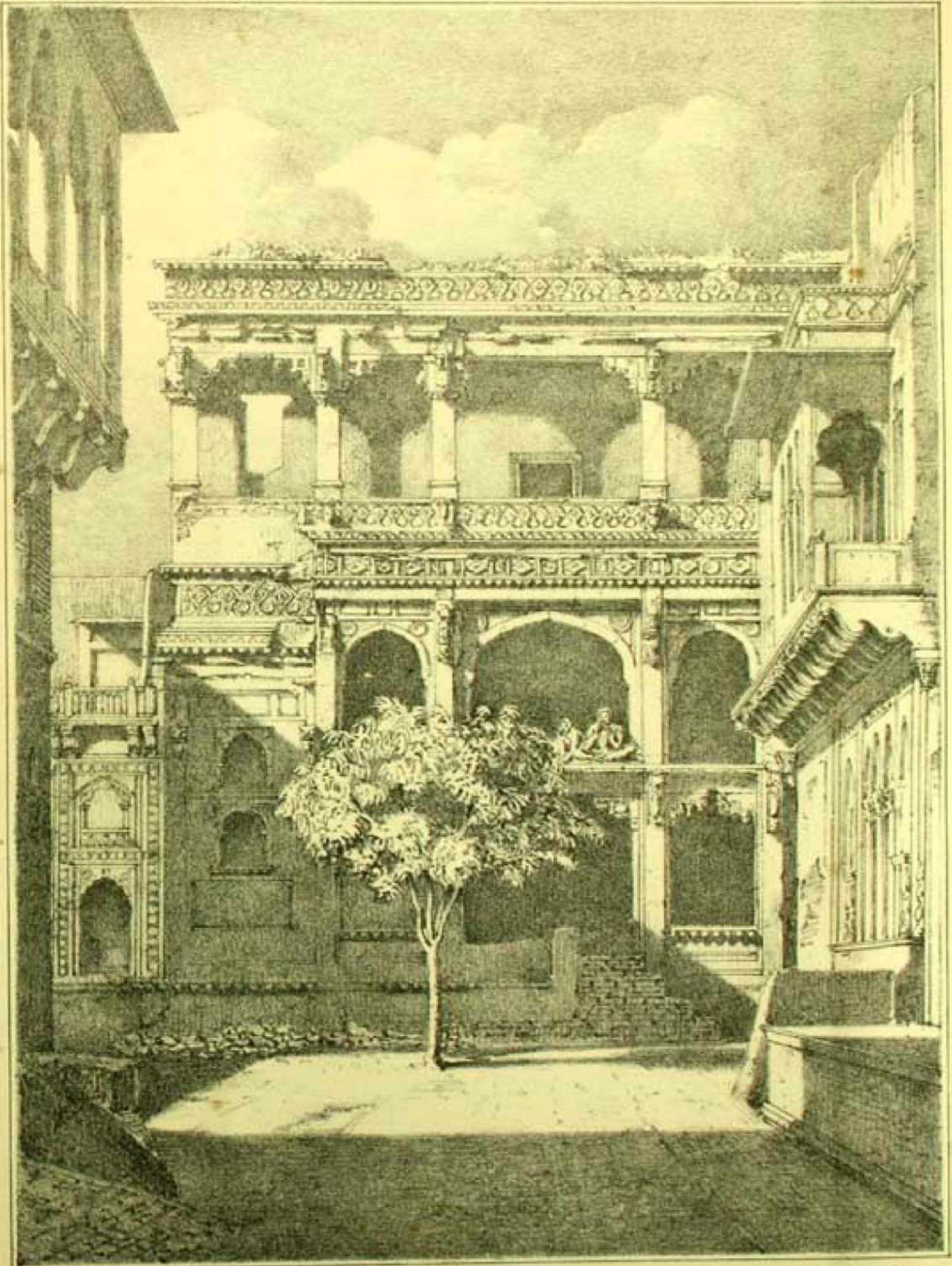
170. O ye wise, if there be any one desirous of marvellous happiness, let him fill the pitcher of his ears and drink in this panegyric, called the *Rasa-sudhá-nidhi*, or 'Treasury of Love's delights.'

Buland-shahr, April 15th, 1878.



GIOHAN.
 F

RESTORED ELEVATION OF-
 THE SATI BURJ, MATHURA.

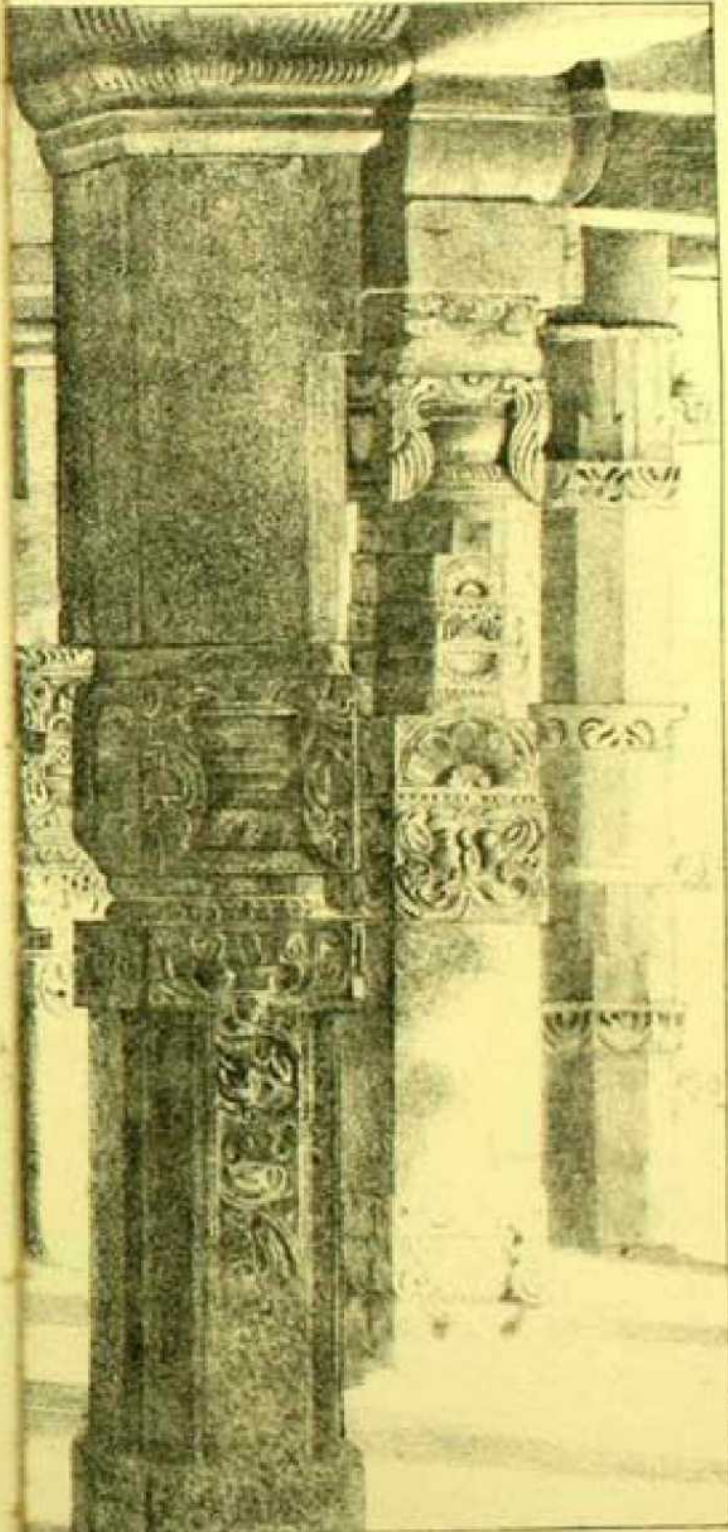


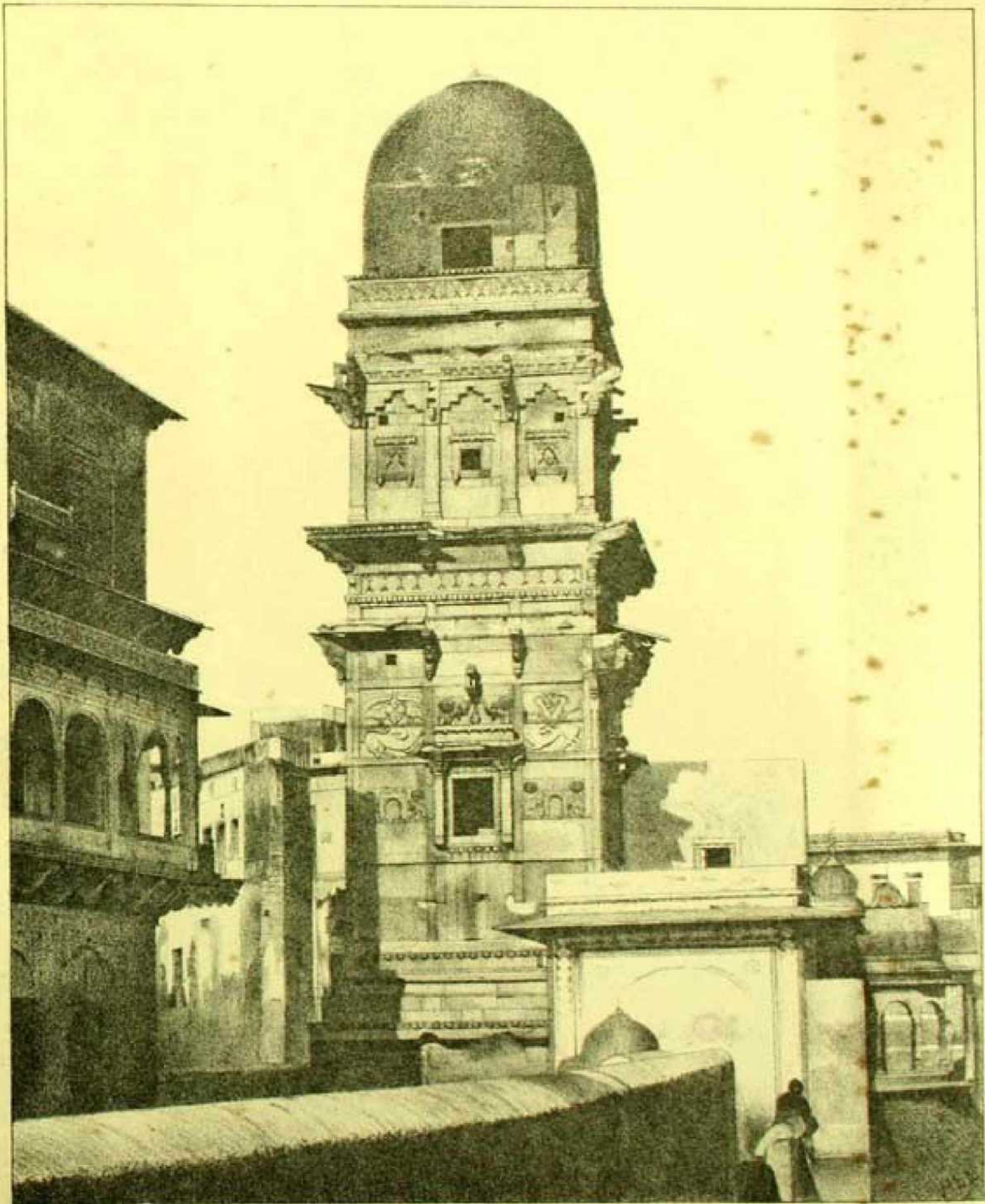
S. Sedgfield Lith.

Calcutta

TEMPLE OF RĀDHĀ BALLABH
BRINDABAN

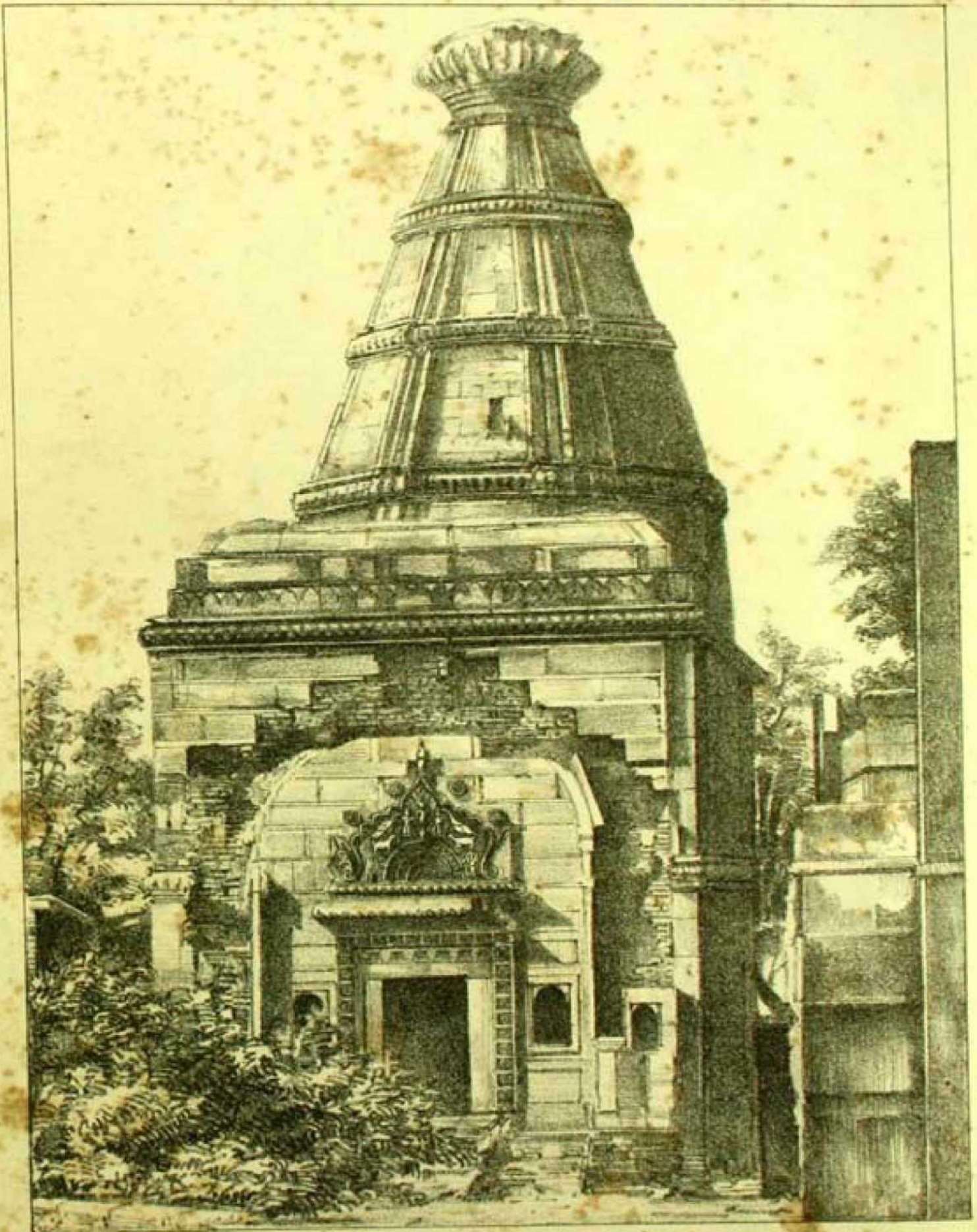
PLATE . X.





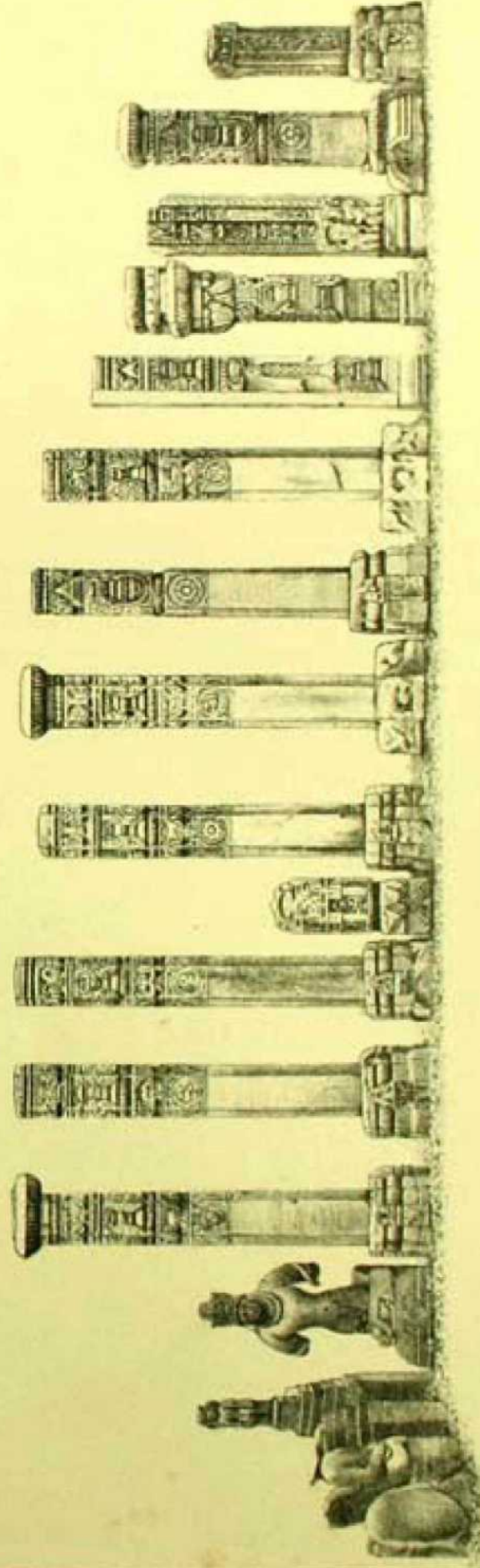
THE SATI BURJ, MATHURA.

(From a Photograph.)



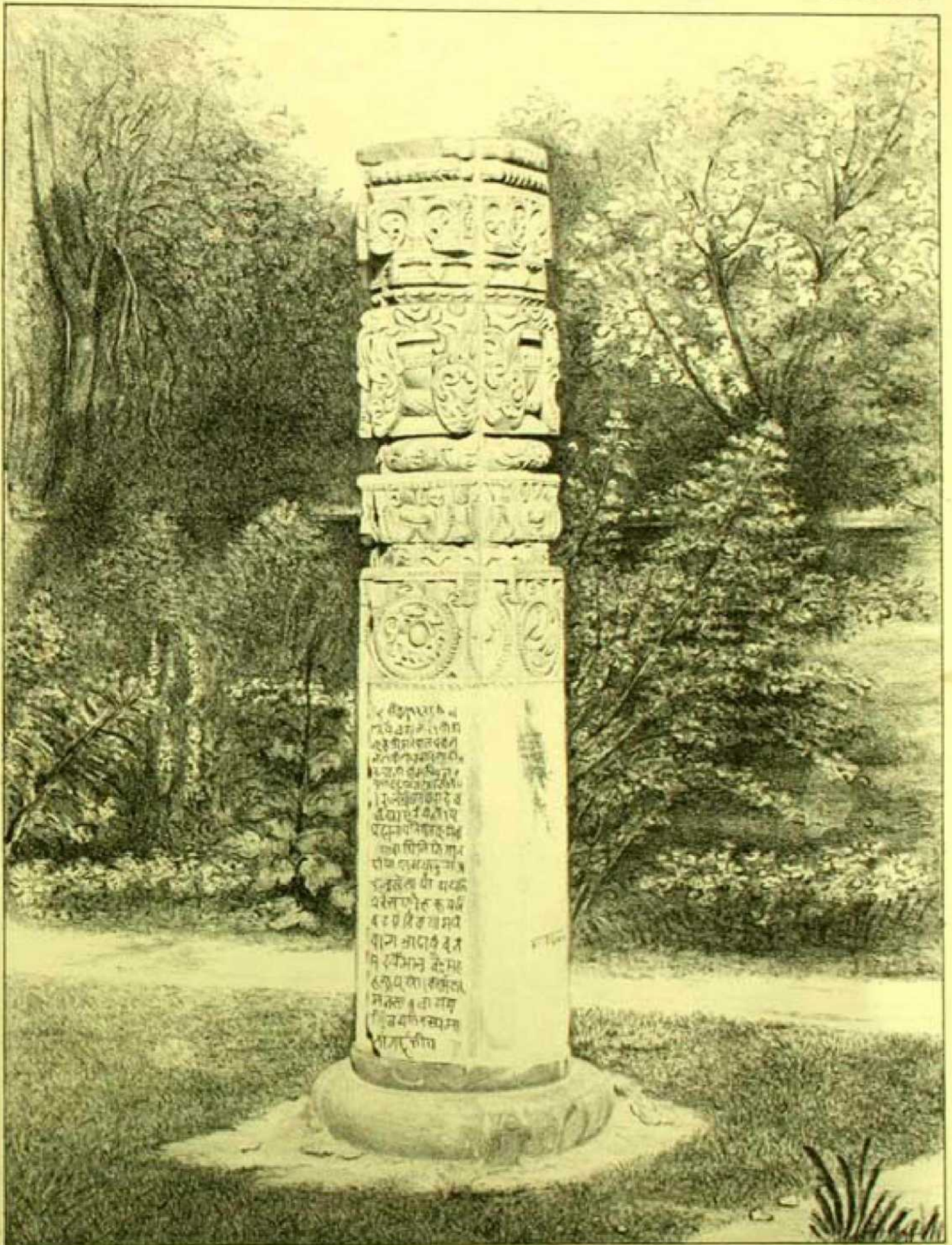
TEMPLE OF JUGAL KISHOR AT BRINDABAN.

(From a Photograph.)



MEDIAVAL HINDU PILLARS, FROM SAHAR.

(From a Photograph.)

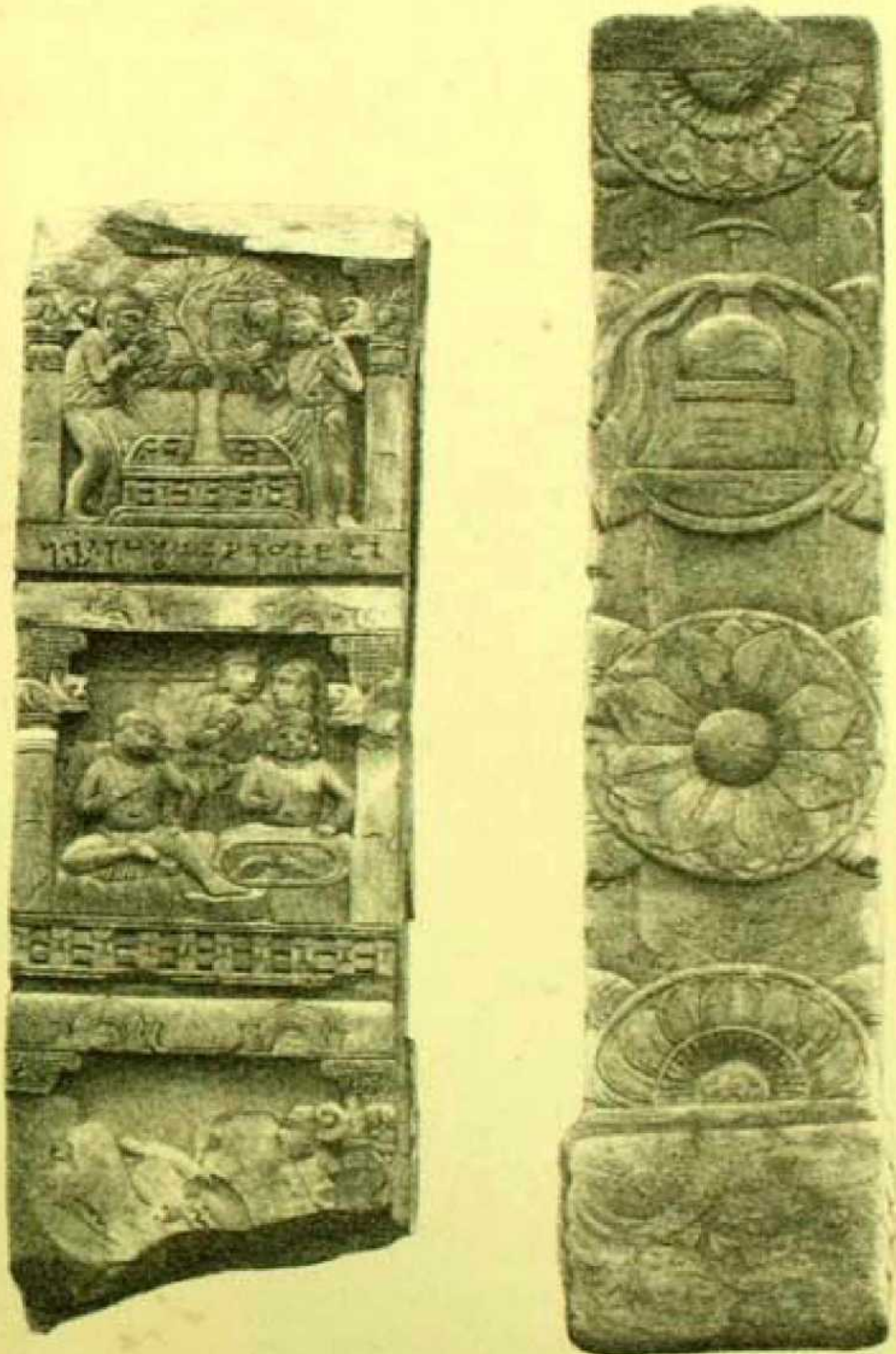


INSCRIBED PILLAR FROM SAHAR
 (From a Photograph)



PILLAR WITH GROTESQUE MASK. FROM ALLAHABAD.

(From a Photograph.)

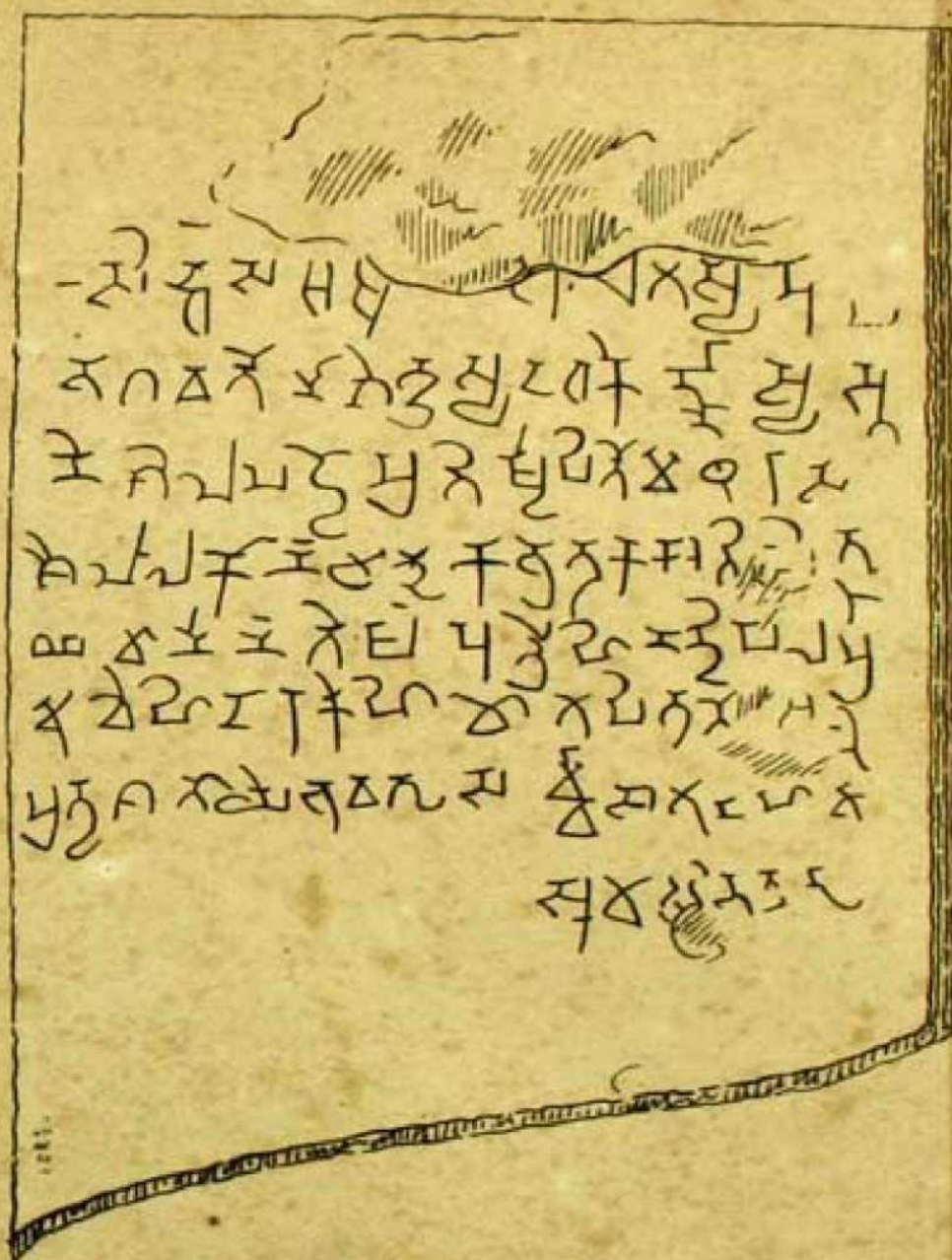


BUDDHIST RAILS, MATHURA.

(From a Photograph.)



BUDDHIST RAIL FROM THE BHUTESVAR TILA, MATHURA.
 (From a Photograph.)



INSCRIBED SLAB.

Found at Mathura in 1873.

उद्यमं च अत्रिं यमद्विंशत्युत्तरं प्रकृतं
नमस्तु त्रुष्टुमि प्रकृतं सप्तमं त्रुष्टुमि

Encegraphed at the Surveyor General's Office Cal

PALI INSCRIPTION.

Found at Mathura.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

—◆—

Part I.—HISTORY, LITERATURE, &c.

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No. III.—1878.

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The Song of Mánik Chandra.—By G. A. GRIERSON, C. S.

Introduction.

In my notes on the Rangpur dialect, I promised to give an account of the song whose name heads this article, and that promise I shall now do my best to redeem. I find, however, that the task has been more difficult than I anticipated. I do not doubt but that king Mánik Chandra, and his terrible wife did once exist; but the traditions current concerning him run so counter to ascertained history, that I have been able to discover very few grains of truth amongst the legendary chaff that has accumulated about his name.

To begin with; the first name we meet with is a crux. Mánik Chandra's brother was a *Pála* king.

Mánik Chandra himself was certainly not a *Pála*, for he was a *baniyá* by caste, while Abul-Fazl describes the *Pálas* as *Kayasthas*.* Moreover, I know of no dynasty of *Pála* kings, containing names ending in "Chandra," like Mánik Chandra, Gopí Chandra, or Bhava Chandra. The brother's name was Dharma Pál.

The following account has been drawn from various sources. I have consulted BUCHANAN throughout, and wherever his story differs from mine in important particulars I have recorded the points of disagreement.

* Cf. however, Mr. Westmacott's article on the *Pál* Kings, in Vol. LIX of the *Calcutta Review*, on which I have drawn freely, and gratefully, while treating on the present subject.

In the *Dimlá Tháná* situated to the north-west of Rangpur, and nine or ten miles to the south-east of the sub-divisional head quarters of *Bág-dokará* is the city of Dharma Pál. Buchanan thus describes it—"It is in the form of a parallelogram, rather less than a mile from north to south, and half a mile from east to west. The following sketch (Fig. 1) taken in riding round it, will enable the reader more easily to understand it than my account.* The defences consist of a high rampart of earth, which at the south-east corner is irregular, and retires back to leave a space that is much elevated, and is said to have been the house of the Rájá's minister (*Díván-khána*). On the east side I observed no traces of a ditch, nor gate; but a ditch about 40 feet wide surrounds the other three faces.† In the centre of each of these is a gate defended by outworks, and in these are a good many bricks. At each angle of the fort has been a small square projection, like a sort of bastion, extending however only across the counter-scarp to the ditch; and between each gate and the bastion at the corner are some others of similar construction. The earth from the ditch has been thrown outwards, and forms a slope without a covered way. At the distance of about 150 yards from the ditch of the north-east and south sides, are parallel ramparts and ditches, which enclose an outer city, where it is said the lower populace resided. Beyond these on the south is another enclosure, in which it is said the horses were kept. Parallel to the west side of the city, at about the distance of 150 yards, runs a fine road very much raised; but its ends have been swept away by changes that have taken place in the rivers."

To the west of this city at a distance of two miles, was the city of Mánik Chandra, now, however, called, after his more famous wife *Mayaná Matir kot*.‡

Here Mánik Chandra reigned over the half dozen square miles of territory which constituted him a *rájádhirája*. His wife Mayaná was deeply skilled in magic, an art which it appears in those days, though unlawful for a man, was lawful for a woman.§ She was (so says the legend) the pupil of a mighty magician who by his intense devotion to and abstraction into the Holy Name had acquired immense powers. His mere word was sufficient to strike one dead. He could cause the sea to cease to move,

* The plan given is Buchanan's, and is very fairly accurate. The city is noted for containing within the inner walls three remarkably fine tanks.

† The ditch and rampart are called in Rangpur the *Kot* (कोट अर्थात् बड स्थान यापिया सृत्तिकार दृष्टन् एकटा गड्) G. A. G.

‡ मयना मतिर कोट. This lady is said to have founded several other important towns. Amongst names which still survive I may mention *Mayaná talir hat* (मयना तलीर हाट) and *Mayaná Gudí* (मयना गुड़ी)

§ See verse 60 of the poem.

and the lights in his dwelling burnt with surpassing splendour, though only fed with Ganges water.

Now this man was a sweeper.

The Hā'di Siddha.

He was a *Hā'di*, the caste which acts as sweeper in Bangál. In Rangpur its impurity signifies nameless abomination, a fact which should be specially noted. Rangpur forms part of Kámarúpa. Hither one of the five *Pāṇḍavas* never set his foot, and the land is consequently impure. Its men are not as other men, nor its laws as other laws. It has a special code of its own, most of which can be found in the *Yoginí Tantra*; and this law allows many things (such as certain kinds of flesh eating) to its straitest sects of Bráhmaṇs. Hence impurity in Western India frequently becomes purity in Rangpur; while Rangpur impurity includes things simply inconceivable in *Arya varta*.

The Hā'di of the poem, and of the popular legends of the present day was a *Vaishṇava*; and as Mayaná was also of the same sect (in which the members are practically all of one caste) it is not impossible that she should have had such a man for her Guru.

I say only "not impossible," for I consider it highly improbable, and for the following reasons:—It is evident that the true story has been much transformed in its passage from mouth to mouth, and I believe that the principle recasting (if I may call it so) was due to the influence of the *Vaishṇava* followers of Chaitanya. Translated into common English the story is that Mayaná's chaplain was a man of remarkable sanctity, whom the populace credited with supernatural powers. He was a great saint, and his religion followed that of his historians. The *Yogís* who narrate his history are at the present day followers of the teachers of the religion of Viṣṇu (not, be it observed, the popular *Vaishṇavas*, *vulgo Boishtoms*); and they naturally claimed their hero as belonging to their own sect. It is peculiarly the tendency of this beautiful, almost Christian, religion to preach the doctrine of the equality of castes;—how every valley shall be exalted, and the rough places made smooth. The lowest amongst the low,—the despised and rejected amongst men, is fully capable of attaining equal holiness with the strictest Bráhmaṇ of the holiest sect which worships at the shrines of *Vṛindāvana*. Such being the case, what is more natural than that the ignorant and illiterate members of the same religion, who (like the *Yogís*) have the traditions of a missionary priesthood in their family, should instinctively point out how even an abominable Hā'di can attain the terrible powers which their fathers attributed to a *Vaśishṭha* or to a *Durvása*.

But, now that I have shown that it is quite possible for such an idea to have arisen, I would point out that the man who is now called the

Háḍi Siddha cannot have been originally a *Vaiṣṇava* at all, and was never by caste a Háḍi. He is still occasionally addressed as Haripa (not Háḍipa, or Háripa), which is quite a possible name for a follower of Hari; but on going back even so short a space as the first decade of the present century, we find that Dr. Buchanan, whose powers of observation are unquestioned, describes the Guru of Mayaná Mati as a *Yogí* by caste, whose name was Haripa while he never once mentions the fact of his being Háḍi, which is now much the commoner name. Now in the Rangpur dialect, *a* is frequently lengthened, and *r* is interchangeable with *ḍ* so that the change from *Hari* to *Haḍi* is easy, and such a change, having once taken common currency, would have itself suggested the idea so peculiarly *Vaiṣṇava* to which I have before alluded. (Cf. Max Muller's lectures on the science of language, for evidence as to the tendency of false etymology and of phonetic decay in originating popular legends.) This Haripa, according to Buchanan was the pupil of Kanipa,* who was the pupil of Gorakshanáth. Tháná Dimlá, where these *Yogís* live, is close to Nipál, and we must go there to find out who Gorakshanáth is. I am now writing in Supaul, in the north of Bhágulpur, and not twenty miles from the Nipál frontier; and what I have heard about him here, confirms in a remarkable degree what Buchanan tells of him. The dwellers of the low lands will have nought of him, and we do not find his *cultus* till we reach the half savage Buddhist dwellers of the interior. Here we discover a curious mixture of the *Mahá Bhārata* and Buddhism. They say that during Yudhishtira's journey through the pathless tracts of the Himálaya to heaven, his brethren (as we know) fell behind, one by one, and perished miserably. Here, adds the Nipálí, only one survived,—the club-bearing Bhíma. He was saved by a Buddhist saint called Gorakshanáth who after performing many wondrous acts made him king over Nipál.†

* I know of no religious teacher called Kanipa. There was a Kanapa, who was a teacher of the Jamgama sect of the S'aivas, (Mackenzie *apud* Wilson I. 227), who was of some celebrity, and it is just possible that his name may have been adopted by the *Yogís*, who were originally a Saiva caste.

† The above is the popular tradition I have gathered from oral accounts. The following summary of what is noticeable about Gorakshanáth and the *Yogís* is gathered principally from Wilson.

The first teacher of Buddhism in Nipál, was Manju, who came from Maháchín and who made the valley of Khatmánḍu, formerly a lake, habitable by cutting through the mountains with his scymitar. He taught a pure form of Buddhism, which became afterwards impregnated with Bráhmaṇical ideas through the invitation given by Narendra Deva, king of Nipál, to one Matsyendra Náth a teacher of the *Páśupata* form of the S'aiva religion. This was apparently about the 7th century A. D. This Matsyendra was in reality the Lokeshvara Padmapáni, who descended to the earth by command of the Adi Buddha, and hid himself in the belly of a fish, in order to overhear Śiva teach Párvatí the doctrine of the *Yoga*, and Wilson shows that Padmapáni came either from the east or from the north of Bangál.

It is quite natural that the Buddhists should claim him as their saint, but in reality he was nothing of the sort. He was a teacher of the *Saiva* religion, and one of the reputed founders of the sect of *Yogís*. Whether the *Yogís* of Rangpur are an off-shoot of the Nipáli converts, or whether Gorakshanáth and his fellows came from north-eastern Bangál, or from Ásám, where the *Pásupata cultus*, whose followers finally became *Yogís*, was established I cannot pretend to decide. I am inclined to believe in the former hypothesis, for they themselves have a tradition, that *they came from the west*, having formerly been pupils of Śankaráchárya, who were expelled by him for indulging in spirituous liquor. Besides, they reject, to the present day, the authority of Bráhmans, and have their own priests; and this is just what would be expected from people coming from Buddhistic Nipál. They rose too to power under a dynasty of Pálas, most of the members of which family were Buddhists. Be that as it may, this much however is certain, that at the time of Mánik Chandra, the *Yogís* practised a *Saiva* religion and worshipped a deified teacher of their sect, also worshipped in Nipál, named Gorakshanáth. Gorakshanáth moreover, had already supplanted Śiva himself, and was alone worshipped by his followers.

The poem annexed bears abundant witness to this. At every *Nodus* whether *Vindice dignus* or not, he is brought in as a *deus ex machina*;

Sixth in descent from Matsyendra Náth, in the time of spiritual teachers, comes Goraksha Náth, who, according to this, ought to have flourished in the 8th century. There must however be some mistake here, for it is known that Goraksha Náth was a contemporary of Kabír, and held a controversy with him which is extant (*Gorakh Náth ki Goshthí*, W. I. 213), and Kabír lived in the 15th century. Hence, unless the list of teachers in the *Haṭha Pradīpa* (W. I. 214) is incorrect, Matsyendra Náth must have lived at a much later period than that tentatively assigned to him by Wilson. Another Narendra Deva reigned in Nipál in the 12th century, and it is possible that it is he who introduced Matsyendra Náth, in which case the discrepancy would not be so outrageous. But, here another difficulty arises, we find that we must date Goraksha Náth's pupils' pupil as flourishing in the 14th century, a fact which agrees better with the theory of Narendra Deva II; but then, what becomes of Kabír?

We have seen that Matsyendra Náth taught *Pásupata Saivism*, and it is a well known fact that the *Kānpahád Yogís*, to which sect those who sing the *Mánik Chandra* song belong, are the representatives at the present day of that form of religion. The above account in no way tallies with the tradition mentioned later on, in the text, that the *Yogís* were errant pupils of Śankaráchárya, nor is such a story borne out by the *Śankara Vjaya*. In chapter 41, Śankara successfully combats the *Yoga* doctrine, but he treats his opponents with a respect which he would never extend to backsliding disciples (S. V. c. 41. Bibl. Indica, Ed. p. 198).

That the *Yogís* rapidly became an important sect is evident from the numerous temples dedicated to Goraksha Náth, not only in Nipál but in the Panjáb and North West Provinces. We read that the Emperor Akbar consorted with them. He was initiated into their learning, and, on one occasion, ate with them, at one of their festivals.

not as an ordinary saint, but leading the whole Hindú Pantheon, and the characters of the Mahábhárata to boot. It is Gorakshanáth, and not Siva, who grants a boon, or comforts a sorrowing widow on her husband's funeral pyre. As he is considered in Nipál, so he is here, a saint whose austerities have rendered him not only an omnipotent but The Omnipotent, and who has always been proof against the charms of the most wanton Apsarases ever sent for a holy man's seduction by a terrified *Svarga*. We are bound therefore to assume that the guru of the Lady Mayaná, whatever his name was, and whom for the sake of simplicity we can call the Siddha was a *Yogí*, i. e. a *Saiva* by religion, and professed doctrines which were professed also by semi-Buddhist races in Nipál.

As this introduction relates to the Mánik Chandra poem, I shall, now that I have stated my opinion concerning his identity, for the future call him as he is called in the modern edition of the poem, the Hádi Siddha.

Dharma Pa'la.

The Hádi Siddha was, as I have already said, of great power, but his pupil Mayaná, by dint of continued practice of her magic art, became greater still. She could control everything but fate; and the whole of the poem is nothing but a description of her struggles with that resistless passive energy.

According to universal tradition both in Buchanan's time, and at the present day, her husband, Mánik Chandra was brother of Dharma Pála. This I have before shown, is an impossibility if the names are correct.

In order to obtain an approximate date for Dharma Pála it is necessary to consider two lists of dynasties. They are now-a-days the traditional history, and they agree with Buchanan's account. The following are those I have collected :

1. Dharma Pála.
2. Mánik Chandra (his brother; died early).
3. Gopí Chandra.
4. Bhava Chandra.
5. A Pála Rájá. Name unknown.
6. Here Buchanan reasonably suggests a period of anarchy.
7. Níla Dhvaja.
9. Chakra Dhvaja.
10. Nílámbara.

According to Buchanan, Nílámbara was defeated by Husain Sháh about the year 1500 A. D.; and thus, allowing six reigns to a century, (a moderate estimate), we must date Dharma Pál as having flourished

about the year 1350 A. D. ; he certainly (if he ever existed, and if the dynasty lists are true) cannot have lived much before the commencement of the 14th century, *i. e.*, before our English King Edward III.

Abul-Fazl gives a list of ten Pála Kings quoted by Mr. Westmacott ; and they became extinct about the middle of the eleventh century thus leaving a space of 250 years to be accounted for. Hence it need not necessarily be determined that Dharma Rájá was a member of the great family of Pála Kings. Buchanan suggests that he may have represented the remains of a family which survived the wreck of the dynasty, to save a portion of the kingdom which remained unconquered, by the successors of Ádi Súra in Rangpur ; and the fact is not rendered less improbable when we consider the history of the Hádi Siddha. We know that the Pála kings were, when we first meet them, Buddhists and that subsequently some branches of the family changed their religion to some one or other of the many varying sects of Hindúism. If then Dharma Pála ruled in a country in which such a holy man was arch-priest, it is rather a confirmation than otherwise of this theory. I myself think it certain that Dharma Pála was a member, or descendant of the great Pála family, for Dr. Buchanan gives an illustration of an image found in his city, which contains the typical Pála emblem of an elephant borne down by a lion. (Fig. 2.)

We thus I think can be certain of the following facts,—that early in the 14th century a king named Dharma Pála ruled over a small tract of country near the Karatoyá river in the present districts of Rangpur and Jalpaiguri. That this Dharma Pála was a member of the great Pála family which once ruled over northern Banga. That in his territory there was a saint of considerable sanctity, then living, who professed tenets borrowed possibly from Nipál. And that close to his capital city there lived in a fortified stronghold a powerful chief named Mánik Chandra, who was married to a lady called Mayaná. It may be gathered from local tradition that Mayaná was an ambitious and designing woman, and that she acknowledged the saint above-named as her spiritual instructor.

Between the king and the chief, according to local tradition, a war arose, which ended in the defeat and disappearance of the former, and triumph of the latter, in a great battle fought on the banks of the river Hángrigosha. The battle-field is still shown, a mile or so to the north of Dharmapur.

Ma'nik Chandra.

After this victory, Mánik Chandra took up his residence at Dharmapur, while the Lady Mayaná remained at her old home *Mayaná Matir koṭ*

probably to be near her old Guru, the ruins of whose home are still shown in the neighbourhood.

The further particulars regarding Mánik Chandra will be gathered from the annexed poem. Who he was we cannot tell, we must be content with knowing that he was a neighbouring chief of Dharma Pála and his conqueror.

He appears to have governed at first with vigour and success. We read of rustic wealth and security, and light taxation. The revenue system is worth noticing, it was a peculiarly elastic and simple land tax.* The land in those days was little more than a wild forest, and the soil poor and barely cultivated. The sparse *prajás* scraped with their flimsy ploughs the surface of the sandy soil immediately round their homestead and struggled lazily for bare existence. I suspect that, even in king Mánik's time, life and property were not over secure, and under these circumstances it was necessary that the taxes should be light. Each plough-owner was therefore required to pay for each plough in his homestead thirty *káoris* per mensem.† Under the light taxation which may be inferred from this absurd exaggeration of the text, the *prajás* were necessarily happy and contented, until Mánik Chandra did what was in Rangpur the most unpopular thing a zamíndár could do. He engaged a Bangálí Díván. I have in my previous paper enlarged on the hatred of the Rangpurí peasantry for a genuine freshly imported native of the south, and I need not dwell upon it here. Suffice it to say that the new Díván fully bore out the character of his nation, for he immediately doubled the land-tax. The result was a rising of the peasants, and according to their account, the mysterious death of the king shortly afterwards from the effects of Rangpur fever. He left no living child, but his wife Mayaná was subsequently confined of a posthumous one. The child was not born till eighteen months after Mánik's death,—and ill-natured people might feel inclined to consider Mánik Chandra's claim to the title of father not proved; but the poem chivalrously comes to the rescue of Mayaná's reputation, and makes her pass through a long series of puerile adventures (the old tale of Orpheus and Eurydiké with the characters reversed), and finally obtain from Gorakshanáth, and his attendant gods, the boon of having a son of such perfect vigour and

* The same system prevails to the present day in parts of Nípál, where the demand for land is not so great as it is in the more settled British territory. A plough is there, however, only considered as equivalent to eight bigas, the average rent for a plough of land being considerably below that current on this side of the frontier.

† The text says $1\frac{1}{2}$ *budís* of *káoris*. A *budí* is five *gandas* or twenty. One *budí* of *káoris* = a pice. $1\frac{1}{2}$ pice a month = 4 *ánás*, 6 pie, per year per plough. In the light soil of Rangpur, one plough can easily cultivate fifteen *bigas* or five acres of land, so that the annual land-tax was, according to the text, less than $3\frac{1}{2}$ pices per *biga*, or than a penny farthing per acre.

virtue that it would take at least twenty-five months to fashion him. As a matter of special grace he was presented to her with seven months of his growth already accomplished, so that he was in fact born only eighteen months after his conception.*

During Mayaná's pregnancy she became *sati* for her dead husband, and mounted the pyre with his corpse. I need hardly say that the flames refused to touch her, although the relations of her late husband did their best to aid them, by thrusting her more and more into the flames with long poles.†

Mayaná after passing through various adventures survives them all, and in due time gives birth to a son, who is called Gopí Chandra. It is he who is really the hero of the poem, and not his putative father who gives it his name. All references to the latter end before the 154th verse, and the remaining 550 narrate the fortunes of his son.

Apparently from the birth of her child, Mayaná deserted Mayaná matír koṭ and went to dwell in Dharmapur. She was a clever woman and managed to keep up without great difficulty the high rates of land revenue, which had caused the death of her husband.‡ When Gopí Chandra was nine years old, it was time for him to be married, and so Mayaná looked round for a suitable match.

Rāja' Hari's' Chandra.

At the present day, seven or eight miles south of the ruins of Dharmapur, in the tháná of Darvání, there is a village called Char Chará.§ Here there is a large mound of earth called Hariś Chandra Rájár Pát, *i. e.*, the seat of king Hariś Chandra.

Buchanan described it as a circular mound of earth about 40 feet in diameter. "In searching for materials to build a pig-stye, the heap was opened by an indigo-planter, and a building of stones was discovered. The

* The Yogís of course see nothing extraordinary in this ludicrous idea. They say the events occurred in the *Satya Yuga*, when all things were possible. I asked a Yogí once why the child was presented to Mayaná already seven months developed, and he explained that it was "to prevent excessive scandal," which might have occurred if the child had been born twenty-five months after his father's death!! This is straining at a gnat, and swallowing a camel with a vengeance.

† The description of this rite in the poem is curious enough: whether such conduct on the part of the relations was common in the performance of it I do not know. I have been unable to identify Chánd the merchant, who figures in this part of the poem with any other legend.

‡ I gather this from the last verse of the poem, from which it is evident that it was not till Gopí Chandra's return that the land revenue was reduced to its former level.

§ चर चरा, it is a short distance due east of the better known रामगञ्ज दुपामारि *Rāmganj Dupāmāri.*

upper parts of this, consisting of many long stones, were removed, when a friend of more science in antiquities, recommended the planter to abstain from further depredations. In its present state the lower part only of the building remains and is a cavity of about 13 feet square at the mouth, and 8 at the bottom. The sides are lined with squared stones, which form a deep stair on each side, and the walls are exceedingly thick. My description will be more easily understood by consulting the plan (fig. 3). I have no doubt that this is a tomb."

Since Buchanan's time it has been still further desecrated, and, now, little remains beyond the mound of earth and the name.

Hariś Chandra had two daughters Aduná and Paduná.* These he gave in marriage to Gopí Chandra with a hundred maid-servants to wait upon them.† By his eighteenth year Gopí Chandra had no child. It had been foretold to Mayaná that at that age he would die unless he became a Sannyási.‡ So he prepared, much against his will, to go forth wandering in the forests with the Háḍi Siddha. His two wives Aduná and Paduná tried hard to persuade him to stay, and their arguments form, in my opinion, by far the best portion of the poem (vv. 243-302). They contain many touches of true poetry.

This flight of fancy, however, almost immediately leads us into the most unnatural—the profoundest bathos. The king tempted by his wives, in order to put the correctness of his mother's words to the test, makes her pass through the ordeal of boiling oil. Although the king has strength of mind to keep his mother in boiling oil for nine days, it is gratifying to learn that he really was a tender and affectionate son; for when he found at the expiration of that time that his mother had been boiled to death, he began to weep. Mayaná of course was really not dead, she had only changed herself into a grain of mustard seed, and soon reappeared in her proper form. After the usual preparations, the king sets out on his journey with the Háḍi Siddha. His minor adventures need not be recorded here. He passed through many trials as preparations for his future, and finally in an evil moment promised to let the Háḍi have twelve *káorís* wherewith to buy *gánjá*. When he would have given it, he found that the store from which he intended to take it had been spirited away. Thereupon, rather

* In Buchanan, Hudna and Podna.

† Buchanan says that Gopí Chandra had a hundred wives, but I can find no trace of this in any modern legend. The maid-servants may have been concubines, but not wives. They are the hundred damsels mentioned in verse 242. They are it is true called queens in verse 410,—but that is only part of the gross and puerile exaggeration displayed there, Aduná and Paduná being still kept separate.

‡ V. 241. The term Sannyási should be noticed. It is the ordinary term for a Saiva mendicant, Vairági usually representing a Vaishnava one.

than break his promise, he told his companion to pawn him for the money. The Hádi took him at his word to the *bázár*, where all the women fell in love with him, which gives rise to an amusing scene. However they could not afford the twelve *káorís* demanded ; so the Hádi finally took him to the house of a harlot named Hírá.

Hí'ra' the Harlot.

According to popular tradition, Hírá is said to have lived at "Kholá Kutá a village in the west of the Dinájpur District." This place I have been unable to identify. Mr. Westmacott, who has most kindly taken much trouble in assisting me on this point, suggests that the place may be Kholá Háti, a village in the east of that District, where the Dinájpur and Rangpur road crosses the river Karatoyá. There were lately extensive ruins to its north, but they have been excavated by the Northern Bengal Railway people for ballast. This theory is not at all so improbable as it might seem at first sight, for every tradition leads us to believe that Hírá's residence was near the Karatoyá. Dinájpur is to the west of Rangpur, and if the original belief was that Kholá Kutá (? Kholá Háti) was "to the west in Dinájpur" the change for "in" to "of" need not surprise us. The locality of Hírá's house is not mentioned in the poem, but a reference to v. 658 will show that it probably was Kholá Háti.

Hírá, of course, fell in love with the king, and, being a woman of property, easily found it in her power to borrow the twelve *káorís* from a neighbouring banker. The banker drew up the deed of transfer, conveying Gopí Chandra to the harlot's sole use and possession for a period of twelve years, and she then and there paid over the money, and took delivery. The procedure of the sale is worth noticing (vv. 537-546).

After obtaining possession of the king, Hírá had him bathed and adorned in gorgeous apparel ; she then sent for him and tried to tempt him, but though she exerted all her fascinations, and the king was almost yielding, she failed ignominiously, Gopí Chandra piously remembering his mother's parting words.* Indignant at her repulse the harlot went to the other extreme, and put him to perform the meanest and vilest offices of her household. The king was continually ill-used, and beaten, and one of his hardest daily labours, was carrying twelve *bhángí* loads of water from the Karatoyá to her house.

On the last day of the twelve years he went to draw water as usual,—but his strength failed him and he fell into the river.

* Gopí Chandra is much lauded for his continence, but, as it appears that the Hádi before leaving him made him a neuter, there is really little ground for credit.

The beginning of the end.

When the king left his home, his two queens retired from the outer world and shut themselves up in a well-guarded palace. The hundred concubines appear to have become the willing property of a foundling called Khetu, whom Mayaná had cherished and brought up together with her son. This man had subsequently entered Gopí Chandra's service, in the days of his power.

Aduná and Paduná set themselves to playing dice, for they knew that as long as lucky numbers were thrown, the king their husband was well.

The dice continued to fall prosperously until the king fell into the Karatoyá, and then they fell in disarray. A parrot and his mate beheld the tears of their mistresses, and consoling them, offered to go in search of Gopí Chandra.

After some days* the birds found their master, and gave the message of his queens. The king, thereupon wrote a letter on the leaf of a wild plant which grew by, and sent it by them to his mother, who on receiving intelligence of her son summoned the Hádi, who in his turn went to the king.

The Hádi then proceeds to distribute poetical justice all round. All the woes which Hírā had inflicted upon Gopí Chandra, she is made to suffer herself. He then cut her in two, her upper half becoming a bat, and her lower half a minnow.

The Harlot's maid-servant was cursed to become as her mistress had been, and in her old age to marry a peon, who would beat her every day of her life. Finally we have the fruit of all the king's penance in his being imbued with a knowledge of the magic art by his eating a filthy mess of the Hádi's concoction, and he returns home, still however wearing his pilgrim's weeds. His maid-servant was the first to see him, but she did not recognize him. His own wives wavered in their recognition when he denied his identity. The only being that did not hesitate, was his faithful elephant who made obeisance to him while he was yet afar off.

After the usual festivities Gopí Chandra again ascended the throne, and made his subjects happy by fixing the land revenue again at the old rate of thirty *káorís*.

Concluding remarks.

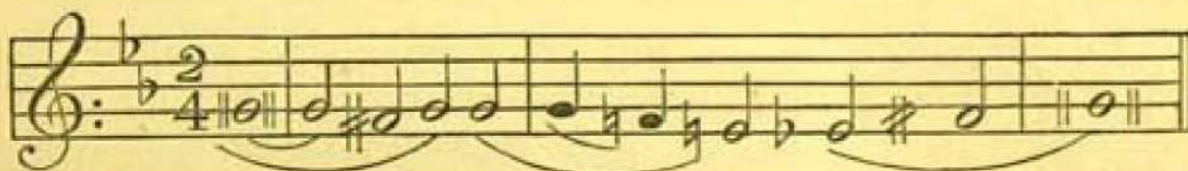
Such is the epic of Rangpur, containing here and there a tiny pearl of interest, hidden amidst the rubbish, which is mainly presented to our view. I have ventured to write so much about it, and to submit it to the Society for three reasons.

* There is considerable confusion here amid dates.

First, I believe that men more competent than I, may be able to add a little to the history of the Pála kings, after considering it. Second, because it exhibits a curious, and most instructive lesson as to how a purely Saiva hero celebrated by men of a Saiva sect has given rise to a poem of Saiva foundation, but of Vaishnava superstructure, and sung by the descendants of these same men. Nay more, how a distinctly Saiva sect, has become to all intents and purposes a Vaishnava one, while it still retains its old gods, and its old heroes. It would not be difficult to find parallel transformations in more modern religious history. Thirdly, and more for this reason than any other, because it is a very fair specimen of the peculiar Rangpurí *patois*. And here it may be noticed, that any parts purely and distinctly Vaishnava interpolations or additions (*e. g.* the introductory lines) are written in a Bengálí much more classical, than the rude language of the Saiva ground-work. This will be evident to any one who pays attention while reading.

The song is usually sung by four men,—and in parts, not in unison. I am not sufficiently acquainted with Hindu music to give the technical name of the chant. It certainly is the only song I have heard in this country in which harmony is introduced. The top notes of the chant are as follows:

To be sung an octave lower than written.



This is sung chant-like, so as to go once to each line, but leaving the three last notes without words. To these last three notes, the words "He! Rájá!" "He! Mayaná!" "He! Yame!" or some such apostrophe which depends on the person whose adventures are being immediately narrated, are sung as a sort of burden. An example will make this clear. Take the first line of verse six. It is sung thus—

Svo Basso



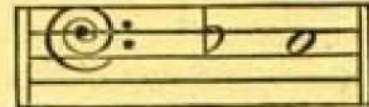
manikehandra raja banga bá-da sa- ti He rá- já

I do not give the harmonies of this, because I cannot. I tried to reproduce them on a harmonium, but though I believe I got the separate notes of each part correctly first on a violin, from the mouth of each

singer, when I tried them together I got nothing but a common-place sort of chant, containing one or two consecutive octaves, and not a particle of the spirit of what I had just heard sung. The above is the music of the narrative portion of the poem. Each "*duyá*," has a separate melody of its own.

As the song is sung, the upper part is accompanied in unison on the *saringa*, of which an illustration, taken from Buchanan is appended.

(Fig. 4.) The open note is tuned to E flat



and the higher notes are formed by pressing down the wire on the various projecting knobs over which it passes.

In conclusion, as I stated in my former paper, the poem is in many places unintelligible to every body I have met. In such places (*satya yuger kathás*) the singers have sometimes traditional interpretations. In one or two cases, however, they do not profess even to such: and, I trust, that I may be pardoned under such circumstances for giving a literal translation, without attempting to educe sense out of the arrant nonsense thus arrived at.

मानिक चन्द्र राजार गान ।

भावियो रामेर नाम चिन्तियो एक मने ।	
लइले रामेर नाम कि करिवे यमे ॥	१
अधमे ना नैल नाम जीभेर आलिसे ।	
अमृतेर भाण्ड तनु गरासिल विषे ॥	२
हेँटे याइते ये जन रामेर नाम लय ।	
धनुक वान लैया राम भक्त सङ्गे याय ॥	३
राम नामेर नौका खान श्रीगुरु काण्डारी ।	
दुइ वाज पसरिया डाके आस पार करि ॥	४
रामेर वन्दन हइल मस्तक उपर ।	
थुइया रामेर गुन सिद्धार गुन गाइ ।	
याके वन्दिलेइ सिद्धि पाइ ॥	५
मानिक चन्द्र राजा वङ्गे वड़ सति ।	
हाल खानाय मासड़ा साधे देड़ वुड़ि कड़ि ॥	६
देड़ वुड़ी कड़ी लोके खाजना योगाय ।	
अष्टमि पुजार दिने पांठा गोटे लय ॥	७
खड़ीवेचा हैये ये खड़ी भार योगाय ।	
तार वदली क्यु मास पाल खाय ॥	८
पातवेचा हैये ये पात आठि योगाय ।	
तारे वदली क्यु मास पाल खाय ॥	९
ऐत मानिक चन्द्र राजा सरया नालेर वेड़ा ।	
एकतन येकतन कैरे ये खाइके तार दुयारत घोड़ा ।	
घिने वान्दि नाहि पिन्दे पाटेर पाकड़ा ॥	१०
कारो माड़ाल केह ना याय	
कारो पुष्कनीर जल केह ना खाय ॥	११

१ । यमे । The usual form for Nom. Sing. in Rangpurī. See my "Notes." Most of the irregular grammatical forms contained in this poem will be found therein, and hence I shall not usually draw attention to them here. ॥ १ । जीभेर आलिसे = जिह्वेर आलस्ये । गरासिल = पास करिल ॥ ४ । पसरिया = प्रसरिया । १० । एकतन येकतन = एमन येमन, अर्थात् ऐमन तेमन । घिने वान्दि = घृणा वान्दिषा, अर्थात् घृणा करिया ॥

भाटि हइते आइल वाङ्गाल लम्बा लम्बा दाड़ि ।	
सेइ वाङ्गाल आसिया मुलुकत् कैल कड़ी ॥	१२
आकिल देड़ वुड़ि खाजना लैल पोनार गण्डा ॥	१३
नाङ्गल वेचायु जोङ्गल वेचायु आरो वेचायु फाल ।	
खाजनार तापते वेचायु दुधेर काओयाल ॥	१४
रांडी काङ्गल दुःखिर वड़ दुष्क हइल ।	
खाने खाने तालुक सब कुन हइया गेल ॥	१५
कोट रायत उठे वले वड़ रायत भाइ ।	
प्रधानेर वरावर सबे चल याइ ॥	१६
कि आज्ञा वले प्रधान सकल ।	
येत रायत परामस करिया प्रधानेर वाड़ी वैले चैले गेल ॥	१७
केमन वुद्धि करि भाइ केमन समाचार ।	
असति राजा हइल राज्येर भितर ॥	१८
प्रधान वले रायत सकल ए वुद्धि नाइ आमार वरावर ।	
चल याइ सिवेर वरावर कि आज्ञा वले बोला रुहेश्वर ॥	१९
यत रायत परामस करिया गेल सिवेर वरावर ॥	२०
सिव ठाकुर वैले तोले छाड़े राओ ।	
घरे क्लि सिव ठाकुर बाहिरे दिले पाओ ॥	२१
सिवके देखिया रायत जन करे परनाम ।	
गले वस्त्र बान्धिया करे परनाम ॥	२२
जीओ जीओ रायत धर्म देउक वर ।	
यत गुटि सागरेर वाला एत आरिबल ॥	२३
केने २ रायत सकल आइलेन कि कारन ॥	२४
केमन वुद्धि करि केमन चरिचर ।	
असति राजा हइल राज्येर भितर ॥	२५
धेयाने वुड़ा सिव धेयान कैरे चायु ।	
क्यु मासेर परमाइ राजार कपाले नागाल पायु ॥	२६

१२। कैल = करिल ॥ १५। कुन = उच्छिन्न ॥ १७। परामस = परामर्श ॥
 १९। बोला = भोला ॥ २२। परनाम = प्रणाम ॥ २२। आरिबल = आयुर्बल ॥
 २६। धेयानै = ध्यान । परमाइ = परमायुः । नागाल is connected with the dhātu लग् ॥

मोर कथा कन यदि मयनार वरावर ।
कैलाश भूवन मोर कैर्वै नखड भण्ड ॥ २७

एक सत्य दुइ सत्य तिन सत्य हरि ।
तोमार कथा यदि कयों मचा पापे मरि ॥ २८

येत रायत जन परामस करिया ।
खीकलेर हाठत नागिया यान चलिया ॥ २९

धूप सिन्दुर नेन पातिल भरिया ।
हांस कैतर नेन खाच्चा भरिया ॥ ३०

धओला पांठा नेन रसी साइङ्ग करिया ।
रविवार दिन निरा थाकिया पारनी गङ्गा यान चलिया ॥ ३१

धम्मरे थान गङ्गा किनारे वान्धिया ।
धओला पांठा देन वालु छेद करिया ॥ ३२

हांस कत गुला देन घाटे उकरगिया ।
धूप सिन्दुर देन घाटे ज्वालाइया ॥ ३३

अपिन्ना विन्नार थोप आने उपारिया ।
नांठि चिपिया साप देन छाड़िया ।
ए साप निले अखल पातिया ॥ ३४

रविवार दिन लोके सांख्यो दिल ।
सोमवार दिन राजार ए ज्वरि करिल ॥ ३५

मङ्गलवार दिन राजा काहिना पड़िल ।
बुधवारै राजा अन्न पानि छाड़िल ॥ ३६

विसुदवारै राजा ए गुरु छाड़िल ।
फिर मङ्गलवारै चित्र गोविन्द दफ्तर खुलिल ॥ ३७

मानिक चन्द्र राजार कय मास परमाइ दफ्तर नागाइल पाइल ।
वेन्ना मुख छैये समन राजाक वलिव र लागिल ॥ ३८

असति राजा हइल राज्येर भितर ।
सेइ राजाक लैया आइस यमालयेर भितर ॥ ३९

२८ । नागिया = लागिया ॥ २९ । निरा = निरशन(?) । ३१ । थान = स्थान ॥
३४ । साप = शाप ॥ ३५ । सांख्यो = शाप ॥

आवाल यमके डाकिवार लागिल । गोदा यमेर नामे चिठि हाथोलात कैरे दिल ॥	४०
तोक वलों गोदा यम वाक्य मोर धर । हाते गले मानिक चन्द्र राजाक वान्धिया हाजिर कर ॥	४१
चामेर दड़ि लोहार डाङ्ग नैले गिरो दिया । तखने गोदा यम चलिल हाठिया ॥	४२
कत दुरे येये गोदा कत पाका पाय । कतक याइते मानिक चन्द्र राजार वाडी पाय ॥	४३
क्यु मासेर काहिला राजा महलेर भितर । तयोत खवर नाहि करे मयना सुन्दर ॥	४४
तोक वलों ये नेङ्गा पात्र वाक्य मोर धर । एइ कथा जानाओ गिये मयनार वरावर ॥	४५
क्यु मासेर काहिला राजा महलेर भितर । देखा कैरवार चाय राज राजेश्वर ॥	४६
ए कथा सुनिया नेङ्गा ना थाकिल रैया । मयनार महले चलिल हांठिया ॥	४७
आग दुयारे मयना मति पसार खेलाय । खिरकिर दुयारे दिया परनाम जानाय ॥	४८
केने केने नेङ्गा आइलेन कि कारन ॥	४९
नेङ्गा वले सेन मा सेन समाचार । क्यु मासेर काहिला राजा महलेर भितर ॥	५०
देखा कैरवार चाय राज राजेश्वर ॥ धेयाने मयना मति धेयान कैरे चाय ।	५१
धेयानेर मध्ये यमेर नागाल पाय ॥ आनिल बाङ्गला गुया मिठाभरि पान ।	५२
ए बाङ्गला गुया काटाइर दिया करे दुइ खान ॥ पानेर बुके चुनेर नेओया दिया ।	५३
हेट खिलि उपर खिलि माइले तुलिया ॥	५३

शोल पुटि ज्ञान दिले खिलित भरिया ।	
पानेर वाटा बान्दिर माथाय दिया ॥	५४
निकलिल मयना मति यात्रा करिया ।	
ये राजार महाले उत्तरिल गिया ॥	५५
केने केने महाराजा डाकिले कि कारन ॥	५६
क्य मासेर काहिला राजा महलेर भितर ।	
तत्त खवर ना करेन मयना सुन्दर ॥	५७
मयना वले सोन राजा राज राजेश्वर ।	
आमार सरीरेर ज्ञान नेओ वेल सिकिया ।	
आमार वसेर नदी कन्दे यावे सुखाइया ॥	५८
आमार वयसे वड़ वृत्त यावे मरिया ।	
दुइ जने राजा कि करिम घर जुयान हइया ॥	५९
राजा वले सुन मयना वाक्य मोर घर ।	
एखनि मोर मानिक चन्द्र यमे लइया याउक ।	
ताहातेओ स्त्रीर ज्ञान गरवे ना सुनाउक ॥	६०
नारीर ज्ञान देखिया ज्ञाने करिल हेला ।	
ठिक दुपर भाड़ुया यम करिया गेल मेला ॥	६१
मरन लसा मारिल तुलिया ।	
जल जल वलिया राजा उठिल कान्दिया ॥	६२
जल खेओओ खेओओ मयना सुन्दर ।	
एक भाड़ि जल दिया प्रान रक्षा कर ॥	६३
एक सत रानी आक्के महलेर भितर ।	
तार हाते जल खाओ राज राजेश्वर ॥	६४
एक सत रानीर हस्तेर जल आइस टानि गोन्दाय ।	
तोमार हाते जल खाइले वऊ भाग्य हय ॥	६५

५८ । वसेर = वयसेर । कन्दे = स्नान ॥ ६० । गरवे = गर्भ ॥ ६१ । दुपर =
दूर प्रहर ॥

एलायु यदि आमि याइ जलक नागिया । ऐत भाङ्गुया यम तोक लइया यावे वान्धिया ॥	६६
राजा वले सुन मयना वाक्य मोर घर । तैल पाठेर खाड़ा थोओ विकानात फेलाया ॥	६७
यखन आसिवे भाङ्गुया यम दैत दानव हया ॥ तैल पाठेर खाड़ा दिया फेलामु काठिया ॥	६८
येन मते मयना मति हस्ते भाङ्गि लैल । हांचि जिठि बाधा विस्तर पड़िल ॥	६९
येन घड़ि मयना मति चतुरार बाहिर हइल । सात दिया सात जना गर्जिया सेन्दाइल ॥	७०
चामेर दड़ा दिया वान्धिल । लोहार मुद्गर दिया डाङ्गाइवार लागिल ॥	७१
के मारेन आमाक विस्तर करिया । मयना मति गेछे जलक नागिया । एक भाङ्गि जल खांओ उइर भरिया ॥	७२
तोर माइया पाइयाके गोरकनाथेर वर । नागाइल पाइले मयना ना करे कुसल ॥ छाटुया पाड़ि किलाइवे आमाक वेलार दुपर ॥	७३
यमेर माइर सवार ना पारिया । मयना वलिया राजा दिल जीउ काड़िया ॥	७४
ऐ जीउ निले गोदा यम नांठित वान्धिया । सात दिया सात जन गेल चलिया ॥	७५
ऐत मयना गङ्गार तीरे गेल चलिया ॥ मयना वले सुन गङ्गा वलि निवेदन ॥	७६
ये राजार पुजा खाइला ए वार वत्सर । एक भाङ्गि जल दिया प्रान रक्षा कर ॥	७७
एक भाङ्गि वदलि वियाल्लीस भाङ्गि लओ । ताहाते धर्मि राजा जीउ वदला ओ ॥	७८

कार वादे जल निया याओ भाड़ि भरिया ।	
सेत धर्मि राजाक् गेल धरिया ॥	७६
एइ कथा सुनिया मयना रोदन करिवार नागिल ।	
लक्ष टाकार भाड़ि पाकाइया फेलिल ॥	८०
चौह ताल जलेर मध्ये मयना आसन करिल ।	
कपाले सिन्दुर मइलान देखिल ॥	८१
हातेर सांखा काल देखिल ।	
लक्ष टाकार दुइ मुठ सांखा मस्तके भाङ्गिल ॥	८२
स्यामि हारा हया रे । आर कत दिन रव चायारे ॥ धुया ॥	८३
महलत लागिआ मयना चलिल हाटिया ।	
येन मयना मति मन्दीरे सोन्दाइल ॥	
आग प्रदीप पाक् प्रदीप लागाइया दिल ॥	८४
यमालय लागिआ मयना चलिल हाटिया ।	
नदीर पारे मयना मति गेल चल्या ॥	८५
नदी देखिया मयना भयङ्कर हइल ।	
क्य मास ओसार नदी बकरत पड़े खेओया ।	
एक एक ठेउ उठे पर्वतेर चूड़ा ॥	८६
विधि आमार दुःखेर कपाल । येमन विन्दार गोपाल ॥	
भाङ्गा नौका छिड़ा काकि गुरु केमने हवे पाड़ ॥	
यदि आमार गुरु सहाय थाके ॥	८७
धरम हाइल धरे, भाङ्गा नौका छिड़ा काकि	
गुरु लाइगाव किराने ॥ धुया ।	८८
परिधानेर साड़ी अर्ज खान मयना मती दिल जलत विक्काया ।	
योग आसन धरिल मयना धरम सरन करिया ॥	८९
तुड़ु तुड़ु करिया मयना ऊङ्गार काड़िल ।	
क्य मासेर दरिया क्य दखे पार हइल ॥	९०
यमपुरि लागिआ चलिल हाटिया ।	
कचिस कुटि यम दरवार वसिके ॥	९१

८३. स्यामि = स्वामी ॥ ८६. बकरत = बसरे ॥ ८८. किराने = کناری ॥
 ८९. सरन = अरण ॥ ९०. दरिया = دریا ॥

येन मते मयना यमालय खाड़ा हइल ।	
भिता भिति यम पालावार लागिल ॥	६२
यमपुरि याया मयना पातिल धुम ।	
कारो उठिल पेटेर विस कारो माथार धुम ॥	६३
ओभा गुनिक हया विस भाड़िया नामाय ।	
औसध करिवार आले जन जन पालाय ॥	६४
येन मते गोदा यम मयनाके देखिल ।	
आपनकार महलक लागिया ए दौड़ करिल ॥	६५
आपनकार महले याया घरे नुकाइल ।	
ऐठे हइते मयना मति दिसा हारा हइल ॥	६६
धेयाने मयना मति धेयान कैरे चाय ।	
धेयानेर मध्ये घरत लागाल पाय ॥	६७
ओ रूप थुइल मयना एकतर करिया ।	
माइलानी रूप हइल मुरत वदलाइया ।	
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येन मते गोदा यम मयनाक देखिल ।	
टाटि भाड़िया गोदा यम ए दौड़ करिल ॥	१००
मार मार वलिया मयना नि याय पिठिया ।	
एक सत हालुया हाल वय निधुया पाथारे ॥	
हरिन वलिया यमक नि याय पिठिया ॥	१०१
ऐठे हइते गोदा यम दिसा हारा हइल ।	
इचला माऊ हइये दरियाय भाप दिल ॥	१०२
धेयाने मयना मति धेयान कैरे चाय ।	
धेयानेर मध्ये इचलार लागाल पाय ॥	१०३
तुड़ु तुड़ु करिया मयना ऊङ्गार काड़िल ।	
वेयाल्लिस भइस हइल मुरत वदलाइया ।	
ऐ दरिया भइस पड़िल भूम्य दिया ॥	१०४
खार खाइतेर यमक नि याय पिठिया ।	
मध्य दरियात यमक धरिल ठासिया ॥	१०५

८४। ओभा = उपाध्यायस्य ॥ ६६। नुकाइल = लुकायित हइल ॥ ६८। एकतर = एकव । मुरत = मूर्ति ॥ ६९। राखो = रख ॥ १०१। नि = लइया ॥

ऐत गोदा यम आठिया वज्जर ।	
डाइन पिड़ेर दण्ड भाङ्गिया उठिया दिल लड़ ॥	१०६
ऐटे हइते गोदा यम दिसा हारा हइल ।	
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ओ रूप थुइल मयना एकतर करिया ।	
पानकाउड़ि वानोयार हइल मुरत वदलाइया ॥	१०८
पाखार साठते नि याय पिट्टिया ।	
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ऐटे हइते गोदा यम कोन काम करिल ।	
गचि मच्छ हया कादात मिसाइल ॥	१११
ऐटे हइते मयना मति धेयान कैरे चाय ।	
धेयानेर मध्ये कादात लागाल पाय ॥	११२
तुड़ु तुड़ु करिया मयना ऊङ्गार काड़िल ।	
राजहांस हइया काद जारितेर गोदा यमक नि याय पिट्टिया ।	
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ढेकेया फेलाया मयना मतिक पालाइल काड़िया ।	
ओ रूप थुइल गोदा यम एकतर करिया ॥	११४
घुगड़िर रूप हइल मुरत वदलाइया ।	
पातालक लागिया गेल चलिया ॥	११५
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एखन कि चिनिवे मोक मयना मति साली ॥	११६
धेयाने मयना मति धेयान कैरे चाय ।	
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ओ रूप थुइल मयना एकतर करिया ।	
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पाताल भुवनत नागिया गेल चलिया ।	
ऐटे याया गोदा यमक धरिल ठांसिया ।	
छेनेक छेनेक करिया यमक उठाइल टानिया ॥	११९

ओ रूप धुइल मयना एकतर करिया ।	
आपनार रूप हइल मुरत वदलाइया ॥	१२०
उपर कैरे फेलेया यमक किलिवार लागिल ।	
किलाइते किलाइते हात हापसाइल ॥	
चितर करिया फेलाइया यमक नेदावार लागिल ॥	१२१
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घड़ानी कैतर हइये सर्गे उड़े गेल ॥	१२२
सिकिरा वाज हइल मयना मुरत वदलाइया ।	
आकास हइते गोदा यमक फेलाइल टालिया ॥	१२३
ऐटा हइते गोदा यम दिस हारा हइया ।	
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कठिया तेलीर वाड़ीक नागिया गेल चलिया ।	
कठिया तेलीर माचात थाकिल वसिया ॥	१२५
धेयाने मयना मती धेयान कैरे चाय ।	
धेयानेर मध्ये सलेयार नागाल पाय ॥	१२६
ओ रूप धुइल मयना एकतर करिया ।	
विलाइ रूप हइल मयना मुरत वदलाइया ॥	१२७
एक विलाइर वदली वियाल्लिस विलाइ हइया ।	
कठिया तेलीर घर लइल घेड़िया ॥	१२८
एक दण्ड दुइ दण्ड तिन दण्ड हइल ।	
सुवोधिया गोदा यमक कुवोधिया नागाल पाइल ॥	१२९
माचा हइते गोदा यमक मृत्तिकाय नामाइल ।	
टरकिया याया मयना मती गरदानात धरिल ॥	१३०
ऐत गोदा यम आंठिया वज्जर ।	
आङ्गलेर सान्दि दिया उठिया दिल लहड़ ॥	१३१
ओ रूप धुइल यम एकतर करिया ।	
वैष्णव रूप हइल यम मुरत वदलाइया ॥	१३२
काकड़ार माठिया लइल चन्दन करिया ।	
साइलेर फल लइल माला करिया ॥	१३३
एण्डार ठाल लइल आसा करिया ।	
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यत वैष्णवेर मध्यत रहल वसिया ॥	१३४
धेयाने मयना मती धेयान कैरे चाय ।	
धेयानेर मध्ये वैष्णवेर लागान पाय ॥	१३५
ओ रूप थुइल मयना एकतर करिया ।	
मौ माक्कि हइल मयना मुरत वदलाइया ॥	१३६
एक माक्किर वदली वियाल्लिस माक्कि हया ।	
सेवार वाड़ीक नागिया गेल चलिया ।	
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वैष्णव सकल बले भाइ सेन समाचार ।	
कोन वैष्णव अपराधी आक्केन सभार माभ ॥	१३८
येन मते गोदा यम माक्कि देखिल ।	
वैष्णवेर केथार तलत् सन्दाइल ॥	१३९
येन मते मयना मति सन्दान देखिल ।	
उडाओ दिया यमेर घाड़त पड़िल ॥	१४०
माक्किर कामड़ सइवार ना पारिया ।	
गोदा यम पालाइल काड़िया ॥	१४१
माक्कि रूप थुइल मयना एकतर करिया ।	
आपनार रूप हइल मुरत वदलाइया ॥	१४२
एत गोदा यमक धरिल पिठिया ।	
एक पांजा एलुया खेड़ आनिल उकड़िया ॥	१४३
वान पुटि कुचनि पाकाय तेपथीत वसिया ।	
मयनार कमड़े यमेर कमड़े वान्दने वान्दिया ।	
हातेर हेमतालेर लाठि दिया नि याय डाङ्गाइया ॥	१४४
मयना बले सुन यम बलि निवेदन ।	
आमार स्यामी धन देख्यो आर काड़िया ॥	१४५
तोमार स्यामी धन आमि ना दिव काड़िया ।	
एटे हइते मयना मति रोदन कैरते नागिल ॥	१४६
आमार पति नाइ घरे रे दीननाथ	
आमि कार लछे रवरे नविन वसते ॥ धुया ॥	१४७

१३६ । मौ माक्कि = मधु मल्लिका ॥ १३८ । माभ = मध्ये ॥ १४१ । सइवार = सचिवार ॥ १४४ । वान = वाओयात्र = द्वापंचाशत् । तेपथीत = विपथे ॥

तुड़ु तुड़ु करिया मयना ऊङ्गार छाड़िल ।	
यत मनि गनक ऊङ्गारे नामाइल ॥	१४८
पुष्प रथे गोरक विद्याधर ।	
ढेकि वाहने नामिल नारद मुनिवर ॥	१४९
वासायार पिटित नामिल भोला महेस्वर ।	
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पांच भाइ पाण्डव नामिल ठांइ ठांइ ।	
यत सत मुनि नामिल तार लेखा योखा नाइ ॥	१५१
माथार चुल मयना दुइ आध करिया ।	
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रक्षा कर रक्षा कर गोरक विद्याधर ।	
आमार स्यामि धन आनिक्के धरिया ॥	
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यत मुनि गन परामर्स करिया ।	
मयनाक आसीर्वाद देय ॥	१५४
या या मयना तोमाक दिलाम वर ।	
सात मासि क्ले जौक उदरेर भितर ॥	१५५
येन मते मुनिगन आसीर्वाद दिल ।	
सेलार मत आक्लि सरीर क्रमे भारि हइया गेल ॥	१५६
आठार मासे जन्म उनिस वत्सरे मरन ।	
सिताव करि भजे छाड़िर चरन ।	
ऐ गुरु भजिले ना हवे मरन ॥	१५७
ऐ कथा सुनिया मयना ना थाकिल रया ।	
आपनकार महलत नाइगे उतरिल गिया ॥	१५८
नओ कड़ा कड़ि निल हस्तत करिया ।	
गङ्गार कुले गेल चलिया ॥	१५९
नओ कड़ा कड़ि दिया मृत्तिका किनि निल ।	
आपन महलक लागिया गमन करिल ॥	१६०

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 हरिगुन गान मयना गाइवार लागिल ।
 सङ्गीर्तन करिवार लागिल नदीर पाहार लागि गमन करिल ॥ १६४
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 तार निचे वसाइया गेल तैलेर हाड़ी ।
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रक्षा कर रक्षा कर गोरक विद्याधर ।

याओ याओ मयना तोमाक दिनु वर ॥
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 पाटेर साड़ी मयना परिधान करिया ।
 सुवर्न काटारि आमेर ठाल निल हस्तेते करिया ।
 उत्तर दक्षिने राजाक निल सोताइया ॥ १७०
 मयनार डाइन हस्तेते राजा सितान दिल ।
 राजार वाम हस्त मयना सितान दिल ॥ १७१
 एकखान करिया खड़ी दिल नगरि घरे घरे ।
 आकास जमिने खड़ी ठेक लागिल ॥ १७२
 चोया चन्दन छिटाइल चन्द्र सदागर ।
 अनल लागाइया दिते नाइ एक रति ॥ १७३

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हरि बोल बलिया अनल लागाइया दिल ॥	१७५
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२५४। यीस = यीश ॥ २५८। गिरस्त = गिरस्त ॥ अथीत = अतीत ॥ २६०। विलातेर = ولايت ॥ २६१। नाकान = ? न्याय ॥ २६२। तन = सन ॥

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२६० । मिक्के = मिथ्ये अर्थात् वथा ॥ २६१ । पासरिमु = ? स्पर्श करिव ॥
२६८ । काया = काय ॥ २६९ । दुद = दुग्ध ॥

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३०६। मुल्लुकर = ملک ॥ ३०७। दरवारत = دربار میں ॥ ३०८। ३११। पति
 = प्रति ॥ ३१२। दोया = द्वितीय ॥ ३१३। कागा = काक । cf. the Braj Bhāṣā
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तुरु तुरु करिया हाड़ि ऊङ्गार काड़िल ।	
सुन्नाकारत हारि सिद्धा जङ्गल सिर्जाइल ॥	४६७
कोट जङ्गल काड़िया वड़ जङ्गले पाओ ।	
आउ छाउ सुखाइल मुखे ना आइसे आओ ॥	४६८
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हाटिवार ना पारे राजा कपाल चड़ मारे ॥	४७०
आमार एंइ दुःख वैलमु कार आगे ।	
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केल कदम्बर गाक् घांटाय सिर्जाइल ॥	४७२
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आंजुलत आंजुलत चक्षत आइल निन ॥	४७३
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वांओ उरु मृत्तिकाय देखो छनेक मारि सुख ॥	४७४

४६७ । सुन्नाकारत = शुन्याकाशे ॥ ४७१ । उवजील = उपजिल अर्थात् जन्म रहल ॥
४७२ । निन = निद्रा ॥ ४७४ । पेनु = पाइलाम ॥

वांओ उरु हारि मृत्तिकाय फेलि दिल ।	
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सात हात ओसार माझि एक वुक उच्च ।	
ऐटे हइत वान्धि नि याओ दारियापुर सहर ॥	४७७
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सात हात ओसार माझि एक वुक उच्च ।	
ऐटे हइते वान्धि नि याइल दारियापुर सहर ॥	४७९
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वच्च चापर राजाके तुलिया मारिल ।	
गुरु गुरु वलिया राजा कान्दिया उठिल ॥	४८१
माझि वान्धिया आमि वड़ पेनु दुख ।	
वार कड़ा कड़ि देखो खांओ सुख ॥	४८२
वार कड़ार गाझा खांओ किनिया ।	
तवे तोमाक लइया याइ घाड़पुरक लागाइया ॥	४८३
येन मते धर्मि राजा सम्वाद सुनिल ।	
राम राम वलिया कर्नत हात दिल ॥	४८४
ए गुलाक खान गुरु वाप मो ना जाने ।	
एमन अनाचारर सङ्गत आइसे कोन जन ।	
अनाचारर सङ्गत आइले अवस्य मरन ॥	४८५
वार कड़ार बदलत गुरु वारो काओन लओ ।	
वान्दा कान्दार कार्य नाइ फिरिया घरे याओ ॥	४८६
ध्यानत आकिल हाड़ि चमकिया उठिल ॥	४८७
ध्यानत हाड़ि गुरु ध्यान करि चाय ।	
ध्यानर माभत सोल काओन कड़ी भोलार लागाल पाय ॥	४८८
एर मा मान आके ज्ञानत डाङ्गर ।	
सोल काहन कड़ि दिक्के भोलङ्गार भितर ॥	४८९

तुरु तुरु करि हाडी ऊङ्गार काडिल ।	
सोल काचोन कडी सुन्नत उडा उडाइया दिल ॥	४६०
व्याद मेन करिया एक मेन पाथर भोलाय सिर्जाइल ।	
भात धरिया धर्मि राजा डुगिवार लागिल ॥	४६१
दे दे कडि वलिया हाडि काउसिवार लागिल ।	
एकवार दुइवार गोस्या नागाइल पाइल ॥	४६२
भोलङ्गार गिरा खुलिया फेलाइल ।	
भोलार गिर खुलिया पडिया गेल धान्दा ।	
भोलार कडि भोलाय नाइ अचम्बितेर कथा ॥	४६३
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चट करि साची थुइल हाडि वसु माता माइ ।	
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आपना आपनि वान्दा निक्के हाडिचो ना राखि ॥	४६६
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वार कडा कडि थाकिया वान्दा थुइवार चाइ ।	
वार कडा कडि पाइले गाझा खाइवार चाइ ॥	४६८
देखि देखि केमन चेला देखिवार चाइ ॥	४६९
हात कोना धरिया राजाक वेइर कैल टानिया ।	
भलमल करिया राजा उठिल जलिया ॥	५००
गोयालिनी वले गुरु करि निवेदन ।	
सुन्दर रुप देखि राजाक भातर उपर ।	
एचो नाकि खावार पारे गोयाल लोकर घर ॥	५०१

४६० । सुन्नत = शुन्ये ॥ ४६१ । गोस्या = غصه ॥ ४६५ । कमवक्ताक =
 مچھ کعبخت کو ॥ ५०१ । नाकि = न्याय ॥

काड़िया भरिया टाका देखो भोला भरिया नेओ ।	
आमार महल काड़िया अन्य महल याओ ॥	५०२
महाराजाक लइले तवे हस्तत धरिया ।	
दोकानर गलि बेड़ाय हांठिया ॥	५०३
वान्दा नेओ वान्दा नेओ चिड़ा वेचि माइ ।	
येन मते चिड़ा वेचि राजाक देखिल ।	
चिड़ार दोकान खान पाकेया फेलिल ॥	५०४
राजार कमर धल्ये मरों वलिया ।	
अनेक करिया निल छोड़ाइया ॥	५०५
वान्दा नेओ वान्दा नेओ हलदि वेचि माइ ।	
वान्दा नेओ वान्दा नेओ साक वेचि माइ ॥	५०६
वान्दा नेओ वान्दा नेओ आड़इ वेचि माइ ।	
वान्दा नेओ वान्दा नेओ कालाइ वेचि माइ ॥	५०७
येन मते कालाइ वेचि राजाक देखिल ।	
घरर स्यामिक आइल बाप दाय दिया ॥	५०८
येत दोकान सब फेलाइल पाकेया ।	
राजार कमर धरिल मरिनु वलिया ॥	५०९
चिड़ा वेचि उठिया बले काला वेचि ऊत्तिया तुइ ।	
काड़िया दे राजार कमर आरो धरनु मुइ ॥	५१०
राजार कमर धरिया टानिवार लागिल ।	
अकारन करिया राजा कान्दिवार लागिल ॥	५११
राजार कान्दने हाड़िर दया जनमिल ।	
इन्द्र राजाक लागिया ऊड़ार काड़िल ॥	५१२
धुम धाम करिया पाथर पड़िते लागिल ।	
राजार कमर काड़िया सब घराघरि गेल ॥	५१३
दुयार काड़ दुयार काड़ कालाइ वेचि भोन ।	
भिजिया बाहेरा देखन भिजिया मरि बाहेरा देखन ॥	५१४
येन मते कालाइ वेचि सेल्टा कथा पाइल ।	
हाउक दाउक करिया दरजा काड़ि दिल ॥	५१५
कालाइ काड़ा गाइन निया ये आइल ।	
रे गाइन दिया डाङ्गावार लागिल ॥	५१६
नाक चुल काठिया टेराडारा दिल ।	
घारत हात दिया बाहिर करि दिल ॥	५१७

ओक काड़िया गमन विजय हालुया ।	
साक्षात उतरिल याइया ॥	५१८
वान्दा नेओ वान्दा नेओ हालुयार घर ।	
सुन्दर चेला वान्दा थोओ तौर हालुयार घर ॥	५१९
सुन्दर रूप देखों भाखर उपर ।	
एओ नाकि खावार पारे चासा लोकर घर ॥	५२०
इहार योग्यवान आके हिरा वेस्यार घर ।	
केमन करि यावेन नटिर महलर भितर ॥	५२१
योङ् योङ् दामरा थुइचे दरओयाजा टाङ्गिया ।	
कोन भितकार राजा आइसे महले चलिया ॥	५२२
एक डाङ्ग यदि मारे दामराय तुलिया ।	
एक हजार टाका नेय दरओयाजाय वसिया ॥	५२३
ओक काड़िया विजय ममन ।	
नटिर वाङ्गलाय याइया दिल दरिसन ॥	५२४
लकाड़ि खुलिया एक डाङ्ग डाङ्गाइल ।	
सब्द हइल नटिर पुरि वार्त्ता जानाइल ॥	५२५
वान्दि वान्दि वलिया डाकाइवार लागिल ।	
कोटेकार महाराजा चलिया आसिल ॥	
ताहाके आन तुमि चाम्बर हाकाइया ॥	५२६
एइ कथा सुनिया वान्दि ना थाकिल रया ।	
हाड़िर साक्षात गेल चलिया ॥	५२७
केनेर गुणधन एत दुर गमन ।	
सिंहासन थाकिते केन मृत्तिकाय सयन ॥	५२८
वासा खोड़ा नाइ आमार भोलार भितर ।	
एकना चेला आके भोलाङ्गार भितर ॥	५२९
वार कड़ा कड़ि थाकिया वान्दा थुइवार चाइ ।	
वार कड़ा कड़ि पाइले गांजा किनिया खाइ ॥	५३०
वान्दा नाकि निवे तोमार हिरा नटि माइ ।	
देखों देखों केमन चेला देखिवारे चाइ ॥	५३१
हात कोना धरिया वेर करिल टानिया ।	
ढल मल करिया राजा उठिल ज्वलिया ॥	५३२

रूप देखिले नयान भोरे ।

॥ धुया ॥

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एइ कथा जानाइल वान्दि नटिर वरावर ।

येमन रूप आके राजार चरनर उपर ॥

सेमन रूप नाइ तोमार मुखर उपर ॥

५३४

ये राजा वलिया तर्प कर ए वार वत्सर ।

सेइ राजार नागाल पाइलु दरजार उपर ॥

५३५

एइ कथा सुनिया नटि न थाकिल रैया ।

राजार साक्षात चलिल छांटिया ॥

५३६

हाड़ि वले सुन नटि आमार वरावर ।

भाल चेला वान्दा थुइ तोमार वरावर ॥

५३७

वार कड़ा कड़ि थाकिया वान्दा थुइवार चाइ ।

वार कड़ा कड़ि पाइले गांजा किनिया खाइ ॥

५३८

एइ कथा सुनिया नटि न थाकिल रैया ।

वन्दर साउद महाजनक आनिल डाकिया ॥

५३९

देयात खत कलम योगाइल आनिया ।

वार कड़ा कड़ि नटि आनिल गनिया ॥

५४०

लेख लेख वलिया हाड़ि ऊकुम भाला दिल ।

सन तारिख स्त्री कागजत लिखिल ॥

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हिरा नटि नामटा कागजत लिखिल ।

ऐ वार कड़ा कड़ि कागजत लिखिल ॥

५४२

धर्मर नामटा कागजत लिखिल ।

ऐ कलम फेलाइया दिल हाड़िर वरावर ॥

५४३

येन मते हाड़ि सिद्धा हस्तत कलम पाइल ।

राम राम करिया दस्तखत करिया दिल ॥

५४४

वार कड़ा कड़ि गनिया हाड़िर हस्तत दिल ।

हाड़िर हस्तत महाराजाक नटीर हस्तत दिल ॥

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ऐ दिन हइते धर्मि राजा बन्धन पड़िल ।

ऐ खत तुलिया नटीर हस्तत दिल ॥

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काम क्रोध मनि भिड़िया वान्धिल ।

ना राखी ना पुरुस राजाक करिल ॥

५४७

येन मते हिरा नटी वेना मुख हइल ।	
ए वार कड़ा कड़ी मृत्तिकाय गाड़िल ॥	५४८
येन मत धर्मि राजा वेना मुख हइल ।	
सुनाली कुमड़ा हइये पाताल भेजिल ॥	५४९
चौह ताल जलर भितर योग आसन धरिल ।	
वार बतसर थाकिल हाड़ि ध्यान धरिया ॥	५५०
येन मते धर्मि राजा फिरिया देखिल ।	
गुरुक ना देखिया राजा कान्दिवार लागिल ॥	५५१
नटी बले राजार वेटा कान्द कि कारन ।	
तोमार वादे तप करि ए वार बत्सर ॥	५५२
कोनटि गेल वान्दि आगेया पान खाव ।	
धर्मि राजाक आन क्किनान कराइया ।	
येटे ये सोभा पाय आन राजाक पराइया ॥	५५३
क्किनान कराइया आनिल धरिया ।	
विक्रान करिते नटी भाल जाने ॥	५५४
साटीर उपर पाटो विक्राय एक वुक उकल ।	
तार उपर फेलेया दिल इन्द्र कम्बल ॥	५५५
लं जायफल करपुर राखिल ठांइ ठांइ ।	
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इति ॥

I am sorry to say that the above text was copied out by an energetic *bābu* who had the greatest contempt for the dialect it illustrates. He showed his contempt by carefully *correcting* the text, wherever it differed much from his idea of the *sādhu bhāshā*. I did not discover this until the first two hundred and fifty verses had been printed off; so, thus far, the above must be taken *cum grano salis*. The principal improvements will be noted in the terminations of the genitive and locative. I may point out here, that Rangpurī possesses an instrumental ending in *ए*, which may easily be confused with the Bangālī locative. Thus *हाने* in Rangpurī means "with a hand", while in Bangālī it means "in a hand," of which the Rangpurī would be *हानत*.

Translation of the Song of Ma'nik Chandra.

1. Think on the name of Ráma, meditate on him with a single mind. If thou utterest the name of Ráma what can Yama do. 2. The wicked man did not utter the name of Ráma in the sloth of his tongue: and even though it was a receptacle of ambrosia, his body was devoured by poison. 3. Who walketh uttering the name of Ráma, along with him goeth a servant of Ráma armed with bow and arrow. 4. The ship that is called by the name of Ráma, hath for its pilot the Holy Master himself. Opening out his arms he crieth out "Come, I will ferry thee across." 5. I have placed the worship of Ráma upon my head. I pause awhile from considering his virtues, and sing the virtues of one who hath accomplished (his path of holiness). By praising him I obtain the accomplishment of my desires.

6. Mánik Chandra was a very pious king in Banga. Each month he used to collect a tax on each plough of seven and a half *ganḍas** of *káorís*. 7. The people paid a tax of seven and a half *ganḍas* of *káorís*, and on the day of the *Ashṭamí pújá* used to bring him a herd of goats. 8. The fuel-seller, who supplied him with fuel, had six months' taxes remitted to him in consideration thereof. 9. The leaf-seller, who supplied him with bundles of leaves, had six months' taxes remitted to him in that consideration. 10. Such a king was Mánik Chandra that his *ra'iyats* fences were built simply of thin reeds; the man who lived at hap-hazard, even he had a horse at his door. So proud were they, that not even the maid-servants wore *sáris* made of jute. 11. No one had need to use the foot-path of another, and no one had to drink the water of another's tank.†

12. From the south there came a *Bangálá* with a long beard; and that *Bangálá*, when he came, made money from the country. 13. Where the tax had formerly been $7\frac{1}{2}$ *ganḍas* he took 15 *ganḍas*. 14. They sold their ploughs, they sold their yokes, and some sold their ploughshares; through the distress caused by the taxation, some even sold their children at the breast. 15. The misery of the poor unhappy widows became very lamentable; all through the country the villages became broken up. 16. The little *ra'iyats* said to the big *ra'iyats* "Brothers, let us all go to the *pradháns*."‡ 17. Saying, "What advice will all the *pradháns* give," all the *ra'iyats* after consulting together, went to the house of the *pradháns*. 18. "What advice shall we adopt, brothers, and what course of conduct? The king within the kingdom hath become unjust." 19. The *Pradháns* said to all the *ra'iyats*, "This advice I have no power to give; come to S'iva. Let us see what command the mighty Bholánátha will give us." 20. All

* A *budí* is five *ganḍas* or twenty.

† i. e., every one had his own private path to the *hát*, and his own private tank.

‡ The *Rangpurí* term for the village head-man.

the *ra'iyats* after consulting together, went to S'iva's (temple). 21. Calling him "S'iva Thákur," they cried with a loud voice. S'iva Thákur was in the temple, and put his foot outside the door.* 22. When they saw S'iva, all the *ra'iyats* made obeisance. Tying their clothes round their necks, did they make obeisance.

S'IVA SPAKE.

23. "Long may ye live, long may ye live, O *ra'iyats*, may Dharma bless you. May the days of your life be as many as the sands of the sea. 24. Why, why O *ra'iyats*, have ye all come?"

THE RA'ITYATS SPAKE.

25. "What advice shall we adopt, and what course of conduct. The king within the kingdom hath become unjust." 26. The ancient S'iva meditated, and after meditating looked up, and found in the fate of the king that the limit of his life was six months distant.

S'IVA SPAKE.

27. "If ye tell this word unto Mayaná she will assuredly destroy my kingdom of Kailása."

THE RA'ITYATS SPAKE.

28. "One oath, two oaths, three oaths in the name of Hari. If we speak thy word, may we die in great sin." 29. All the *ra'iyats*, after consulting together, went to Sríkalá hát. 30. They filled an earthen pot with incense and vermilion. They filled a coop with geese and doves. 31. They also took a white goat, tying him with a rope. Fasting on a Sunday, they took them to a *tírtha* on the Gangá.† 32. They tied the goat at a place sacred to Dharma on the banks of the Gangá, and sacrificed it there.‡ 33. They offered several geese at the *ghát*, and burnt incense and vermilion there. 34. They rooted up unblown *binná* grass and brought it. And then wringing out his *languṣi*, he (S'iva) gave vent to the curse; and that curse they (the *ra'iyats*) took up in the corner of their garments.

35. On the Sunday S'iva gave the people this curse. On the Monday the fever seized the king. 36. On the Tuesday the king became weak; on

* It is worth noting how entirely the ideas of the author of the poem are circumscribed by the incidents of his village life. Every one, God or man, acts and lives as if he were a simple *Rangpurí* villager. This verse is an instance. When one *ra'iyat* goes out to see another, it is the village etiquette, to bawl out to him, "He! so-and-so," while the visitor is yet a hundred yards or so from the house of him on whom he is about to call. If the latter is "at home," he goes outside his door, and greets the comer. This latter action is called "putting one's foot outside the door." Compare the English expression of "calling on a person."

† By the Gangá, is meant the Brahmaputra. See note to v. 159.

‡ Lit. Dug a hole for the sacrificial post in the same.

the Wednesday he ceased to eat or drink. 37. On the Thursday the king gave up the ghost*: and on the following Tuesday, Chitra Govinda, the accountant of Yama, opened out his account papers. 38. He found in the account papers, that Mánik Chandra had six months to live; and turning his head, he began to speak to Saman Rájá Yama.

YAMA SPAKE.

39. "A king within his kingdom hath become unjust. Bring hither that king within the house of Yama." 40. He began to call for Ábál Yama. He sent a letter (for the king) by Godá Yama.

YAMA SPAKE.

41. "I tell thee Godá Yama, and take thou heed unto my words. Bring Mánik Chandra Rájá here, with his hands and neck tied." 42. He took his leathern rope and his iron hammer, and tied them in a knot; and then Godá Yama started on his journey. 43. Many miles he went, many roads he met. He went a great distance and reached the house of Mánik Chandra. 44. During the six months' illness within the palace, the fair Mayaná did not enquire about the true state of affairs.

THE KING SPAKE.

45. "O Nengá my servant, I tell thee, carry my message: go to Mayaná and tell her about this. 46. Say, 'For six months the king hath been ill within his palace. The King of Kings wisheth to see thee.'" 47. Nengá heard these words and did not tarry. He went off to the palace of Mayaná. 48. Inside the door the Lady Mayaná was playing dice, and through the lattice of the door Nengá made obeisance to her.

MAYANÁ SPAKE.

49. "Why, why, O Nengá hast thou come?"

NENGÁ SPAKE.

50. "Hear, O lady, hear the news; for six months the king hath been ill within his palace. The King of Kings wisheth to see thee." 51. The lady Mayaná became absorbed in contemplation, and, in her contemplation, her eyes fell upon Yama. 52. She took a *bangálá* betel-nut and sweet *míṭha bhari pán* leaf, and divided the nut into two pieces with a knife. 53. In the *pán* leaves she put a little lime, and folded together the *het khili* and the *upar khili*.† 54. She put sixteen scores of charms on the top of

* Or perhaps "lost his power of sensation."

† The little conical shaped parcels of prepared *pán*, which we see in the *bizárs*, enclosing a piece of betel-nut and some lime, are called *khilis*. The outside wrapping is made up of two leaves, of which the lower one is called the *het khili*, and the upper one, the *upar khili*.



it; and put the plate of *pán* on the head of the maid-servant. 55. The Lady Mayaná went out, seeing that it was a lucky time, and arrived at the palace of the king.

MAYANÁ SPAKE.

56. "Why and wherefore did the great king summon me?"

THE KING SPAKE.

57. "The king hath been ill for six months in his palace, and the fair Mayaná did not enquire about him."

MAYANÁ SPAKE.

58. "Hear, O king of kings. Learn the magical arts which I have acquired, and then the river of my life will dry up upon thy shoulder.*

59. In my life time great trees will live and die, and we two shall live together in everlasting youth."

THE KING SPAKE.

60. "Hear, O Mayaná: let Yama carry off me, Mánik Chandra; but nevertheless let not the knowledge of a woman be heard by me."† 61. The king, although offered the arts of women, neglected them; and at exactly midday Cuckold‡ Yama started. 62. He brought the thirsts of death and struck him with them. The king arose crying "Water, water. 63. Give me, O give me water, O fair Mayaná. Give me one vessel of water, and save my life."

MAYANÁ SPAKE.

64. "There are a hundred queens in thy palace. Drink water at their hands, O king of kings."

THE KING SPAKE.

65. "Water, at the hands of even a hundred queens, would smell of fish. It is when I drink at thy hand, that I find great solace."

MAYANÁ SPAKE.

66. "If I go now to bring thee water, that cuckold Yama will bind thee and carry thee away."

* *i. e.* thou wilt live as long as I.

† Lit. my womb.

‡ The word *Bhádṛuyá* is an abusive term, and means, more correctly, a man who makes money by the sale of his wife's person.

THE KING SPAKE.

67. "List O Mayaná. Take heed to my words. Place the knife for sacrificing goats upon my bed. 68. When that cuckold Yama cometh, like a Daitya, or a Dánava, him will I strike and slay with the sacrificial knife." 69. As soon as the Lady Mayaná took the vessel in her hands, many men were heard to sneeze,* and many death-watches sounded. 70. Just as the Lady Mayaná passed outside the house, seven men from the seven quarters came in with a noise like thunder. 71. They tied him with leathern thongs, and with an iron mallet they began to beat him.

THE KING SPAKE.

72. "Who beateth me so often? The Lady Mayaná hath gone to fetch me water. Let me fill my belly with one vessel of water."

THE YAMA SPAKE.

73. "Thy wife hath got a boon from Gorakh Náth. If Mayaná meet us, little good will it bode us. She will kneel upon us, and beat us this very midday." 74. Being unable to bear the beating of Yama, the king gave up the ghost, uttering the name of Mayaná. 75. That ghost took Godá Yama and tied it up in his *languṭi*, and to the seven quarters went off the seven men.

76. But Mayaná went to the banks of the Gangá† and spake "Hear, O Gangá, I make known unto thee my petition. 77. There is a king whose worship thou hast enjoyed for these twelve years; give one vessel of water and save his life. 78. For one vessel of water thou shalt have forty-two vessels; therefore do thou restore to life a pious king."

GANGÁ SPAKE.

79. "For whom thou art taking thy vessel full of water; that pious king hath himself been taken away." 80. On hearing this Mayaná began to weep, and hurled away her vessel worth a *lákḥ* of rupees. 81. Mayaná dived fourteen fathoms beneath the water, and sat in contemplation, and saw that the vermilion on her forehead had become discoloured. 82. She saw that her shell bracelets had turned black, and she broke on her head the two bracelets worth a *lákḥ* of rupees.

THE BURDEN OF HER SONG.

83. "I have lost my Lord. How many days must I wait and watch for him."

84. Mayaná walked to the palace. When the Lady Mayaná entered the temple, she lit both the front and the rear lamps. 85. Mayaná walked

* Sneezing is a sound of ill omen.

† See note to v. 159.

to Yama's abode; the Lady Mayaná arrived on the banks of the dread river. 86. When Mayaná saw the river she became fearful. It is a river six months wide. The ferry-boat finishes its voyage in a year. Each wave seems vast as mountain peak.

THE BURDEN OF HER SONG.

87. "My fate hath become a lot of misery, as Kṛishṇa was of Bindá. The boat is broken and the ropes are worn; how can I pass over, O my guru. That is, if my guru is by me to help me. 88. I will hold the rudder of virtue. O my guru, the boat is broken, and the ropes are worn, but I will cross over."

89. Half her scarf she spread upon the water, and thinking upon virtue, she took her magic seat. 90. Mayaná uttered the words "*tuḍu, tuḍu*," and the journey of six months was accomplished in six quarters of an hour. 91. She walked to Yama's palace, where thirty-six *krors* of Yamas were sitting in the hall of audience. 92. As soon as the Lady Mayaná stood in Yama's abode, on this side and on that side the Yamas began to run away. 93. When Mayaná came to Yama's palace, she spread great alarm; some got colic and some got pains in their heads. 94. She became a Muhammadan doctor and a Hindu doctor, and extracted the poison from their bodies; but when she came to give them medicine every one ran away. 95. As soon as Godá Yama cast eyes on Mayaná, he ran away as fast as his legs would carry him to his own palace. 96. He went to his own palace and hid himself in a room, and from where she, the Lady Mayaná, was, she lost sight of him. 97. The Lady Mayaná went into contemplation and gazed about, and in her contemplation she saw him in his room. 98. Mayaná collected herself together, and laid aside her own proper form. She put on the appearance of a gardener's wife, and went into the palace of Godá Yama. 99. "Godá, Godá", Mayaná cried to him with a loud voice. 100. As soon as Godá Yama saw Mayaná he burst through the *táfi* walls of his palace and ran away*. 101. Mayaná cried "*már már*" and chased him through a treeless field, where a hundred ploughmen were ploughing. Like a deer did Mayaná chase Yama. 102. Thence Godá Yama lost his senses and turned himself into a prawn, and jumped into the sea. 103. The Lady Mayaná went into contemplation and gazed about, and in her contemplation her eyes fell on the prawn. 104. Mayaná uttered "*tuṛu tuṛu*" with a terrible cry, and changed herself into forty-two buffalos, who jumped into the sea. 105. Eating cress she chased Yama. In mid-sea she caught Yama by the neck. 106.

* Compare note on v. 21. All the houses of the peasantry in Rangpur are built of *táfi* (mat) walls. When a thief is caught in such a house, he attempts, usually successfully, to escape by bursting through these flimsy obstructions.

There Godá Yama, mighty as the thunder-bolt, burst the staff she held in her right hand and fled. 107. Thence Godá Yama lost his senses and he became a minnow and began to swim in the water. 108. Leaving her former shape, Mayaná concentrated herself and became a *Pánkauri* and *Ványár*,* by a change of her form. 109. With flappings of her wings she chased him, and in mid-sea she snapped up Godá Yama in her bill. 110. Then Godá Yama, mighty as the thunder-bolt, thrust Mayaná off, and ran away. 111. Thereafter what did Godá Yama do? He became an eel, and hid himself in the mud. 112. Thence the Lady Mayaná went into contemplation, and her eyes fell upon him in the mud. 113. Mayaná uttered "*tuḍu, tuḍu*" with a terrible cry, she became a swan; pecking at the mud she chased Godá Yama, and in mid-sea she seized Godá Yama by the neck. 114. He thrust off the Lady Mayaná and fled away. He cast aside his former form, and Godá Yama concentrated himself. 115. He took the form of a maggot and went off to Pátála. 116. When he arrived at Pátála, Yama twisted his beard (boastfully). "Now, how will the *śyáli*, the Lady Mayaná, recognize me." 117. The Lady Mayaná went into contemplation and gazed about, and in her contemplation her eyes fell on the maggot. 118. Leaving her former shape Mayaná concentrated herself, and became an ant by a change of her form. 119. She went to the world of Pátála, and, seizing Godá Yama by the throat, gradually pulled him up out of the ground. 120. Leaving her former shape Mayaná concentrated herself, and became her ownself by a change of form. 121. She threw him down on his face, and began to belabour Godá Yama. She continued belabouring him till her hands were weary. She then turned him on his back, and began to kick him. 122. Then Godá Yama, mighty as the thunder-bolt, became a house pigeon and flew off to the sky. 123. Mayaná changed her shape, and became a falcon and a hawk, and she pecked at him and cast Godá Yama down from heaven. 124. Thence Godá Yama lost his senses, and became a mouse changing his form. 125. He went to Kaṭhiyá the oilman's house, and hid himself under his *máchá*.† 126. The Lady Mayaná went into contemplation and gazed about, and in her contemplation her eyes fell upon the mouse. 127. Leaving her former shape Mayaná concentrated herself, and became a cat by a change of form. 128. She changed herself from being one cat into forty-two cats, and surrounded the house of Kaṭhiyá the oilman. 129. One *daṇḍa*, two *daṇḍas*, three *daṇḍas* passed, and the ill-natured woman caught good-natured Godá Yamá. 130. She made him descend from the *máchá*, and with a sudden leap the Lady Mayaná seized him by the neck. 131. Thence Godá Yama, mighty as the thunder-bolt, slipped out between the interstices of her claws and fled.

* Two kinds of fish-eating birds.

† A bamboo-bench.

132. Yama left his former shape, and concentrated himself. He became a *Vaishṇava* and changed his form. 133. He used the earth castings of crabs instead of sandal-wood paste, and made his rosary of *Sáil* seeds. 134. Hopefully he took a branch of a castor-oil tree (for his stick), and going into a *Vaishṇava pūjā* house, sat himself amongst the worshippers. 135. The Lady Mayaná went into contemplation and gazed about, and in her contemplation her eyes fell upon the *Vaishṇava*. 136. Mayaná gave up her former shape. She concentrated herself, and took that of a bee. 137. In the place of one bee she became forty-two bees, and set out for the place of worship, and she flew around the heads of all the *Vaishṇavas* there. 138. All the *Vaishṇavas* said, "Brothers, hear the news. What sinful *Vaishṇava* is in this assembly?" 139. As soon as Godá Yama saw the bees, he slipped under the quilts of the *Vaishṇavas*. 140. As soon as the Lady Mayaná found out where he was, she settled down upon Yama's neck. 141. Not being able to bear the stings of the bees, Godá Yama ran away from the place. 142. Mayaná laid aside her bee-shape, and, after concentrating herself, took her own form. 143. She seized Godá Yama, and plucked up from the ground an armful of *eluyá* grass. 144. Fifty-two times sixteen scores of ropes she twisted, sitting at a place where three roads meet,* and tied her own waist to that of Godá Yama. Then she carried off Godá Yama beating him with a rod of cane.

MAYANÁ SPAKE.

145. "Hear, O Godá Yama, while I make my petition. Set free my husband, who is my only wealth."

GODÁ YAMA SPAKE.

146. "Thy husband I will not set free", and thereupon Mayaná began to weep.

THE BURDEN OF HER SONG.

147. "My husband is no longer in my house, O lord of the unhappy. For whom shall I abide in the days of my youth?"

148. Mayaná uttered "*tuḍu, tuḍu*" with a terrible cry, and all the Heavenly Munis came down on hearing her voice. 149. In a chariot of flowers, came Gorakh the Vidyádhara. Riding upon a flail, came Nárada

* The fact that a place, where three roads meet, is considered especially favourable for performing magical rites, is worth noticing. I need hardly draw attention to similar customs obtaining in Europe. In Tirhut,—it is customary, when a person is sick, to cast away at midnight at a place where three roads meet, an offering of some yellow cloth, a fowl, and some condiments, over which some charms have been recited. It is believed that the disease will then leave the sick man, and seize upon the wayfarer who first comes across the offering in the morning.

the best of munis. 150. On the back of Vásoyá came Bholá, the lord of the world. Riding on a bow and arrow came Ráma Chandra and Lakshmana. 151. The five Páñḍava brothers came down here and there; there is no counting the number of munis who came from heaven. 152. Mayaná parted her hair in two, and fell at the feet of Gorakh Náth.

MAYANÁ SPAKE.

153. "Help, help, O Gorakh the Vidyádharma. He hath carried off my husband, who is all my wealth. He will not give back my husband, who is my wealth."

GORAKH NA'TH SPAKE.

154. "Hear my words. All the munis have taken advice, and have blessed thee, Lady Mayaná. 155. Go, O Mayaná, we give to thee a boon. Let there be a foetus developed for seven months now within thy womb." 156. Even as the munis blessed her, her body which was as light as *solá* (pith) gradually became heavy.

THE MUNIS SPAKE.

157. "In eighteen months, it will be born, in its nineteenth year it will die. But, if it worship a Hádī's feet with steadfast mind, it will not die." 158. On hearing this Mayaná delayed there no longer. She started for her palace and arrived there in safety. 159. She took nine *káorís* in her hand, and departed to the banks of the Gangá.* 160. With the nine *káorís* she bought a piece of land, and then returned to her own palace. 161. She broke up the old house and made a bier, and with it went some firewood on litters on men's shoulders. 162. Oil, *ghí*, mustard, and sesamum began to go. She called all her relations, and she cut some fresh bamboos and made a bier. 163. She took the pious king away upon the bier she had prepared, and the Lady Mayaná herself was carried off upon the door of the house. 164. Mayaná began to sing the Song of the Excellence of Hari. She began to praise him as she was carried to the river's bank. 165. She built a funeral pyre running north and south, she buried posts and made a platform. 166. By the side of each post she set a jar of *ghí*. Beneath each of them she set a jar of oil. Mustard seed and sesamum she scattered over the pyre. 167. Mayaná uttered the words "Guru, Guru" with a terrible cry, and Gorakh Náth came there and stood visible.

MAYANÁ SPAKE.

168. "Protect me, O protect me, O Gorakh the Vidyádharma."

* It must be noted, that throughout this poem, the word Gangá does not refer to the river commonly known as the Ganges. It always refers to the Brahmaputra.

GORAKH NÁTH SPAKE.

"Go forth Mayaná, I have given thee a boon. Within the fire thou shalt perceive the cold of Mággha. 169. Mayaná began to spread vermilion all over her forehead. 170. She put on a silken scarf. She took a golden knife and a mango branch in her hand, and she laid out the king towards the north and south. 171. Mayaná laid the king's head on her right hand, and she put her own head on his left hand. 172. In each household a citizen gave one piece of firewood. The pile of firewood almost touched the sky as well as the earth. 173. Water and sandal-wood did Chandra, the merchant, scatter upon the pyre. Not a single near relation was present to set it alight. 174. One who lived near the door of the king,—a bráhmaṇ *guru*,—stretched forth his hand and applied the torch. 175. Each relation cast one vessel of water on the pyre. Together they lustrated the pyre, once, twice, and five times. Saying "*Hari bol*," they set it alight. 176. E'en as the fire smelt the smell of the *ghí*, it blazed up with a great roar. 177. For seven days and nine nights Mayaná stayed within the blaze, and even her apparel though offered to the flames did not take fire. 178. Mayaná burnt the body of the pious king, and placed the ashes in her lap. There sat Mayaná, like a *Gosvámí* in his house. 179. Mayaná burnt the body of the pious king and the smoke rose up to heaven. There sat the Lady Mayaná like unmelted gold. 180. The little relations said to the big relations, "Brothers, thrust at her. Let all the relations thrust at her." 181. The Lady Mayaná is sitting within the fire. She cries: "Hear, O relations, I have a child of seven months in my womb. Let not all the relations thrust at me." 182. The little relations said to the big relations, "Brothers, let us go to Chánd the merchant, and ask his advice. 183. Ye know Chánd the merchant from childhood. Let us see what answer he will give." 184. Behind the door sat the merchant playing dice; and through the lattice, did they make reverence to him.

CHA'ND SPAKE.

185. "Why, O relations, why and wherefore have ye all come?"

THE RELATIONS SPAKE.

186. "For seven days and nine nights Mayaná hath been in the fire, and yet the Fair Mayaná hath not been burnt."

CHA'ND SPAKE.

187. "This Mayaná hath obtained a boon from Gorakh Náth. Fire doth not burn her, nor doth she sink in water. Were the three worlds to come to an end, she would not go to Yama's abode. And yet, O relations, ye wish to slay her. 188. Sit ye in a place where three roads meet, and

twist of grass fifty-two *krors* of ropes; carry ye off a stone weighing twenty-two *mans*. 189. Thrust her forth from the fire, and tie ye the twenty-two *man* stone upon her chest. 190. Cast ye Mayaná and the ashes of the fire away on the stream, that they may float away. Then bathe ye and return to your homes." 191. On hearing this the relations no longer stayed. They carried away the stone of twenty-two *mans*. 192. They thrust the Lady Mayaná forth from the fire, and tied the stone of twenty-two *mans* on her chest. 193. They cast her and the ashes upon the stream, and bathed and returned to their homes.

194. At the expiration of eighteen months and eighteen days Mayaná became filled, and then the (future) pious king turned himself in her womb. "I die, I die," said Mayaná, and she began to weep. 195. She brought into use her magical art called *kharupá* (the art of cutting), and by it she cut open her fifty-two *krors* of ropes. 196. "I die, I die," said Mayaná, as she landed at the foot of a *Ním* tree; and as she ascended, a sound was heard like unto the roaring of heaven in the intermediate quarters. 197. The Maharája fell upon the ground amid the after-birth and birth waters; and he began to cry, saying "*omyá* and *chomyá*." 198. The little relations said to the big relations, "Brothers, let us go and see whose child is crying thus." 199. They took one step, and they took two steps, and they arrived at the spot. Mayaná said unto them. "Hear, O relations and mark my words. 200. Decorate the *pálki* of the old king and bring it here, and take this child-king to the palace." 201. They decorated the *pálki* of the old king and brought it, and they mounted the pious king within it. 202. Big drums, and little drums, guitars, and cymbals sounded in all directions. Cymbals, side drums and kettle-drums sounded in all directions. 203. There was firing of guns and a thick darkness caused by the smoke. Father could not recognize son; he only could call for him. 204. There was a poor man who had a child in the kingdom, and he could not give it food and water in his own house. 205. So he cast it down at a place where three roads meet, amidst its after-birth and birth waters. 206. That child did Mayaná also take up into her bosom, and carry to the palace.

MAYANÁ SPAKE.

207. "I say unto thee, my maid-servant, pay attention to my words." 208. The maid-servant went and called the wet-nurse and brought her. 209. The wet-nurse cut the navel strings of both the children. She took all the presents that Mayaná gave, and went to her own house. 210. What with to-day and what with to-morrow seven days passed, and during the seven days the king caused a concert of flutes and drums to be made. 211. What with to-day and what with to-morrow, ten days passed, and after ten days the king held the first *śráddha* after his father's death. 212.

On the thirteenth day the king held the final *śráddha*, and held a concert of drums and cymbals, and all the relations came and sacrificed. 213. He gave a feast to all his relations, and at that hour the Lady Mayaná first touched fish. 214. What with to-day, and what with to-morrow, a year passed, and after one year another day came. 215. What with to-day, and what with to-morrow, five years passed, and she gave him to be taught by a *guru*. 216. He taught the king to write in four lessons. What with to-day, and what with to-morrow, seven years passed. 217. The king was then named. Mánik Chandra Rájá's son was called Gopí Chandra. 218. And his younger (foundling) brother was called Lankeśwar "Found in the Field."* 219. What with to-day, and what with to-morrow, nine years passed; and then, what did the Lady Mayaná do? 220. She spake as follows to the *Guru bráhmaṇ*.

MAYANÁ SPAKE.

221. "Go, go, O *guru bráhmaṇ*, pay attention to my words. Go quickly before the king Harís Chandra. 222. He has two daughters in his palace, named Aduná and Paduná. Arrange a marriage between them and my son, and return." 223. The Reverend Bráhmaṇ on hearing these words did not delay. But hastened to the palace of king Harís' Chandra. 224. He cried out with a loud voice "Ho! King Harís' Chandra."† The king was in his house and he stepped out. 225. The reverend and learned Bráhmaṇ made salutation. 226. The king gave him a god-like throne to sit upon, and after supplying him with camphor and betel, enquired as follows. 227. "Why and wherefore, O *guru bráhmaṇ*, hast thou come so great a distance?"

THE BRÁHMAṆ SPAKE.

228. "Mayaná hath sent me to thy presence. In thy palace are two damsels named Aduná and Paduná. The fair Mayaná wisheth to form a marriage with them. 229. Mayaná hath a son within her palace, and to him doth she wish to give them."

THE KING SPAKE.

230. "Go, go, I consent," and ordered him away. And the Bráhmaṇ on hearing this returned to Mayaná. 231. They took a load of betel nuts and a load of *pán* leaves. And five bráhmaṇs began to cut the betel and the *pán*. 232. They cut the betel and *pán* and searched for a

* He is also called Khetu, or Khetuwá, and appears to have become Gopí Chandra's servant. He took over his concubines when the latter went on his pilgrimage. See also note to verse 290.

† Compare note to v. 21.

lucky day, and then did they fix the time of the marriage. 233. On the Saturday, Mayaná fasted, and on the Sunday, she made arrangements for the marriage. 234. They planted five plantain trees in King Harís' Chandra's palace, and they lit the golden lamps and the censers on the day fixed. 235. They then sent for five singing women, and cries of "*ulu, ulu*" were heard around. 236. He gave Aduná in marriage, he gave Paduná, and he gave a hundred maid-servants to wait upon them. 237. He gave as wedding-presents a hundred villages, and a hundred elephants. 238. He gave as wedding presents a hundred horses and a hundred cows. 239. After giving them in marriage he allowed them to depart. And immediately afterwards the Lady Mayaná sent an invitation to all the kings of all the kingdoms. 240. From that time that pious king was called Gopí Chandra.

241. After eighteen years, at the advice of his aged mother he became a *Sanyási*. 242. A hundred beautiful damsels, weeping, fell at his feet, "O pious king, do not depart and leave us."

THE QUEEN SPAKE.

243. "Nay, nay, thou shalt not go, my King, to a far country. For whom but thee, have I built up this cold dreary house (of my life). 244. I built a humble* dwelling, nor yet is it sullied by old age. Why art thou leaving me in my youth, and turning my bridehood into vanity? 245. In my dreams shall I see my king. I shall throw my arm on the couch; but the wealth of my life will not be there. 246. Behold, every† mother and sister of a man of modest wealth shall have her master to sleep upon her bosom, while I, unhappy one, will remain weeping in an empty house. 247. When a house is empty and the doors are closed, men come and kick the walls outside. In the time of her youth all voices cast scandal at a widow. 248. Therefore shalt thou take me with thee. I am the life, the wealth of thy life; let thy damsel go with thee. 249. In the time of thy hunger I will cook thy food. When thou art thirsty I will give thee to drink. 250. In mirth and laughter will I pass the night. 251. If we have a long field to traverse, I will wile away the time in talk. When we approach the dwelling of a householder, there will I reverence thee like my *guru*. 252. A cool mat‡ will I spread for thee; on a pillow shalt thou rest thy feet. Laughing and joking will I shampoo thy body. 253. When I hurt thy hand I will shampoo thy feet, and amidst our sport and laughter, I will devour thy bosom, and thou shalt devour

* Lit. pent-roofed.

† Lit. ten. This use of "ten" for "every," is of frequent occurrence in Rangpur. Thus *Das'jan ki kay?* is the stock expression equivalent to "What do people say?"

‡ Vulgo. *Sectul-pat*.

mine. 254. In the hot season will I fan thy countenance with a palm leaf. In the cold month of Mágha I will nestle into thy body for warmth, 255. In the cold month of Mágha I will cook for thee spiced viands.* Indra's favourite sweetmeat, the lap of a hundred wives, will I alone cause thee to enjoy."

THE KING SPAKE.

256. "List, O daughter of king Harís Chandra. In many varied ways art thou displaying thy charms, nor can I bear them. 257. Thy teeth are white as the *solá* pith, from eating the *Vansa Hari* nut. When thou speakest, they glisten (like white flowers), and the bees come humming towards them. 258. If thou goest with me, thou wilt be a woman of fresh and fair appearance, and I will be a man clad in one rough blanket. When they see us, all the people will say—'There goeth a pilgrim, but he is a stealer of women.' 259. And if they say this, no householder will give us shelter. In thy word and in mine, O daughter of a prince, will they put no trust."

THE QUEEN SPAKE.

260. "Hear me, my King, thou loved one not to be deceived.† One petition, and no more I make unto thee. 261. Like thee will I put around my neck a Ráma rosary. Like thee will I wear nought but a single tight and scanty cloth. 262. My two breasts will I tie up in tattered clothes. I will break six of my front teeth. My tresses which hang down unto my knees, them let me cut and cast away. 263. I will take in my hand a hollow gourd. I will cast a rough blanket round my neck. I too will become a pilgrim. Following thy footsteps will I beg for alms."

THE BURDEN OF HER SONG.‡

264. "O! the pipe of Syám. My mind whirls. My eyes flow with tears."

THE KING SPAKE.

265. "O mighty fate. I am encompassed amidst a net of charms. What love is this which I have for a woman. 266. If thou goest with me, thou wilt be going with a pilgrim. There there are tigers of the wood, and when thou seest them thou wilt be afraid. There there are tigers of the wood, and great is the fear of them that be mighty. 267. When a

* Lit. curries made of cold weather chillies.

† Lit. "English."

‡ This *Duyá* forms the first verse of a song in honour of Kṛishṇa, which is given in the appendix.

man and a woman, in such plight as thou and I, go along the road ; the tiger of the wood seizeth the woman and eateth her. 268. Whether the tiger eat thee or eat thee not, he will assuredly kill thee. Why therefore wilt thou kill thyself because thou wouldest follow an ascetic."

269. The damsel began to laugh freely.

THE QUEEN SPAKE.

"Who sayeth these words? and who believeth them? 270. What tiger slayeth and eateth the woman that goeth with her husband? These words are but to deceive, and a pretext for thy flight. 271. Let the tiger of the wood devour me, I fear him not. It is better to die at the feet of my husband than to lead a life of perpetual disgrace. 272. Thou wilt be my banyan tree, and I will be thy creeper. To thy feet will I cling, and then whither wilt thou flee? 273. When I was in my father's house, O pious king, why didst thou not then become a pilgrim? 274. Now I have become a comely woman, and worthy of thee. If thou leavest me and becomest an ascetic, I will surely die. 275. Let the stream of my youth fall down before thee. When the hairs of my head turn gray, then do thou turn pilgrim. 276. The branches of fair jasmines bend down to the ground (with age). I am now a full grown woman, and how long shall I retain my comeliness? 277. How long shall I keep my youth, e'en though I bind it and tie it down. For continually my heart weepeth for my husband."

THE BURDEN OF HER SONG.

278. "Thou hast wedded me, and thou art going. I weep for thee. Thou hast thy father, and thy brethren; but I, unhappy one, have none. I have left them all for thee, O king."

279. He had chosen Aduná and Paduná, and had married them. A *bhāṭṭa* bráhmaṇ had named her Aduná. 280. He himself had called her Aduná and given her maid-servants.

THE KING SPAKE.

"How can I break such love in my house? 281. I will take alms from one door, and will go to the door of another: easily will I lose my Kshetri birth and my Baniyá caste. 282. Where'er I shall see a woman like thee, my youthful lovely wife, there weeping will I lay me down and die. 283. Where'er I shall see a woman like my lovely wife. First will I address her as 'mother,' and then will I ask for alms."

THE QUEEN SPAKE.

284. "Alas, alas, my own husband, thou hast uttered a black word. Thou hast married me in my childhood, and thou desertest me in my youth."

THE KING SPAKE.

285. "Now also wait thou with thy hand upon thy heart. Until I return after fifty years have passed away."

THE QUEEN SPAKE.

285. "Lift up thy head, O king, and see a pair of juicy cocoa-nuts over my heart. The pair of cocoa-nuts shine forth with lustre. 287. I will open the nuts and put them to thy mouth, thou hast not strength in thy body (to pluck them). It is a fruit, which if a man refuse, he will suffer the pangs of hell four times fourteen times.

THE KING SPAKE.

288. "Hear me, O lady, daughter of Harís Chandra. When a secret hath been divulged, the meaning of its words become plain. 289. In front rideth an elephant's *mahánt*, behind him the king. Far have I gone, and (I have learned that) the great house of my pilgrimage is at a far distance. 290. I have tasted the fruit of the cocoanut and my belly was not filled. In vain have I, a householder, suffered* in my servitude."

THE QUEEN SPAKE.

291. "Hear me, my king. My pleasant loved one, one petition have I to make unto thee. 292. "Do not, O pious king, go to a far country. Give me one little child, that I may keep him in my lap. 293. I will keep him and nurse him in my lap, and I will touch thee when I see my darling child. 294. I will place the sun-shade and staff of thy royalty over my child's head. I will be the mother of the king and will enjoy the kingdom." 295. The queen spoke of a child, and the king heard her words and said,

THE KING SPAKE.

296. "What thou desirest is not a *chíní chámpá* plantain, that I may mix it with water and give it thee to eat. It is not the fruit of a tree, that I can pluck it, and place it in thy hands. 297. Fate hath not given thee a child. What can I do? 298. I will repeat the charms of the *gurus* of old, and will become a seven months' child within thy womb. 299. Thou shalt call me 'son.' Thou shalt open the covering of thy breast, and shalt give me milk."

THE QUEEN SPAKE.

300. "I spake to thee of a child, and thou speakest to me of milk. Thou art my wedded husband, how can I call thee 'son.' 301. I knew

* Lít. Died. A popular song makes Gopí Chandra charge his wives with intriguing with Khetuwá Lankes'var as a last resource for getting away. But this is not borne out by any copy of this poem which I have seen.

not, O king, that there were but a sheep* and a jackal within thy heart. Not one *káorí* of sense hast thou in thy body. 302. (Thy mother) because she is a widow, wisheth to make her daughter-in-law a widow too. Even if my husband pass her house, (jealously) doth she turn her eyes upon him."

THE KING SPAKE.

303. "Ha! thou daughter of a vile one; thou hast abused my mother. I might have stayed a few days, but I will go to-morrow." 304. He could not bear the childishness of the damsel, and so the fair king went to the place of audience. 305. (There was a grove) of twelve *supári* trees and thirteen *tál* trees, and in its shade sat the king's son. 306. The bráhmans and the relations all sat in a row, and Bír Simh, his Bháñḍárá, gave him the accounts of the kingdom. 307. On a golden seat sat Mayaná with her feet on a silver stool. The Lady Mayaná went to the audience of her good son. 308. The full cutcherry hummed with the noise of the crowd, and there the fair Mayaná stood. 309. When the king saw his mother, he made obeisance; as he made obeisance, he tied his cloth around his neck.

MAYANA' SPAKE.

310. "Long live the widow's son. May Dharma bless him. May the years of his life be many as the sands of the sea. 311. I thought the widow's son had gone to be a pilgrim; but lo, till to-day he is here with his fair wife. 312. The Satya Yuga is passed, we are in the second Yuga, the third Yuga will come. But in the Kali Yuga sons will marry early. 313. The Kali era is a foul era, and hath now approached. Each sitteth alone and enjoyeth another's wealth. 314. Kings will no longer do justice in their kingdom, and sons will no longer offer sacrifices for their fathers. 315. Wives will no longer be faithful to their husbands. Pupils will no longer reverence their teachers. 316. Behold, four miscreants went to destruction. 317. The miscreant who doth not reverence his teacher, him even jackals will not eat. Even crows will not touch the body of a Vaishnava. 318. Let a miscreant be cast into fire and he becometh dust and ashes. Let him float upon the water and he becometh food for fishes. 319. He is buried beneath the earth and he becometh food for worms. No where do I see salvation for a miscreant."

THE BURDEN OF HER SONG.

320. "My darling blue lotus, how canst thou become an eremite? Men will say there goeth one who hath no mother." 321. The king made up his mind to be a pilgrim, and at a cross-road his queen began to weep.

* I. e. That your heart contained nothing but cowardice and treachery.

THE QUEEN SPAKE.

322. "How canst thou wish to go to a far country? Oh wait and pass the charms of Mayanā through an ordeal. 323. Oh put her to the test of burning oil. If she survive that ordeal, then shave thy head and go forth a pilgrim." 324. The king heard this and hastened to the hall of audience. 325. He sat in the audience chamber, and could not make up his mind. Often and often he called for his servant Khetu, his younger brother.

THE KING SPAKE.

326. "My servant Khetu, take heed unto my words. Go* unto my mother's palace." 327. On hearing this, the servant did not delay. 328. "Say this to Mayanā—('Thy son) would put thee to the test (of burning oil')." 329. Hearing these words, Mayanā laughed. "This is not thy thought, but a conspiracy between thy wives. All the thoughts they teach thee, will become barren. 330. Instead of one ordeal, I will pass through seven, and then will the Prince leave his house."

THE KING SPAKE.

331. "I say unto thee, Khetu, and take thou heed unto my words. 332. Build thou up a furnace deep and wide. Strip off the three fibres of three cocoa-nuts, and place the bare (nuts round the furnace as supports for the cauldron)." 333. Khetu set a cauldron holding sixty *mans* upon the furnace, and into the cauldron he poured eighty† *mans* of oil. 334. He cast upon the flames fuel of *sāl* wood, and set it blazing. Over all he placed a cover. 335. For seven days he ceaselessly added fuel. 336. One day, two days, five days passed. After seven days he lifted the cover. 337. "The oil is hot, even as fire," such words did Khetu speak unto the king. 338. "Thy servant was ordered to make (preparations for) the ordeal by oil. 339. What command hath the king of kings for his servant?"

THE KING SPAKE.

"Go and say this unto my mother. 340. 'The ordeal by oil is ready before the king. The king doth summon thee; O Mother, come quickly'."

MAYANA' SPAKE.

341. "Do I eat at thy fathers' hand, or at the hands of the fathers of the king. At thy command, what ordeal shall I pass through?" 342.

* Note the force of वल्ल here, and in vv. 328 and 332. It has entirely lost any special meaning of its own; and is used as a pure expletive to add strength to an imperative.

† Sic in original.

These words Khetu told the king, who heard them, and became furiously enraged. 343. The king took his evening towel for washing his body, and flung it to Khetu. 344. And Khetu shook that towel, and with it bound tightly the lady Mayaná, and cast her into the oil. 345. Even as the lady Mayaná fell amid the oil, the flames rushed up with a roar to heaven. 346. Mayaná sunk into the oil up to her neck, and, as she did so, she took the oil into her hands and patted it into her head as if she were bathing. 347. Seeing calamity (approaching) the king became furiously enraged. He called Khetu, calling him, "Slave, slave," and began to abuse him. 348. "Lift up the cover and place it over my mother, and for nine days continuously, do thou add fuel to the flames." 349. One day, two days, three days passed away. But Mayaná concentrated herself and took the form of a grain of mustard. 350. After nine days, Khetu lifted up the cover and when he could not see the queen, he began to cry. 351. Thus did he say unto the king. "Thy mother is dead, and gone to Yama's abode. 352. Wherefore dost thou keep thy *págarí* on thy head? Behold (I am unclean) and the assembly of bráhmaṇs will not drink water at my hand." 353. The king cried "Mother, mother" and began to weep.

THE BURDEN OF HIS SONG.

354. "Fate hath made me motherless, O lord of the unhappy. Such was written in my destiny. No longer will I see my mother." 355. He took a handful of twigs in his hand and began to search amidst the oil. 356. Once, twice and thrice he searched. At the third time of searching he fished up the towel. No trace of Mayaná's body was within the fire. 357. Sixteen men took the cauldron on their shoulders, and they flung out the oil at a place where three roads meet. 358. With a loud roar the flames rose to heaven, but Mayaná in her form of a mustard seed remained hidden in the *Dub* grass. 359. Suddenly Khetu began to weep, and when she heard the sound of his weeping, Mayaná felt pity for him.

MAYANA' SPAKE.

360. "Weep not, weep not, Khetu, my servant. Cease thy tears. I am Mayaná. I have not been burnt within the furnace." 361. He took up the sixty-man cauldron in his hand and brought it before the king. 362. Mayaná in fact underwent seven ordeals, and passed them all.

THE KING SPAKE.

363. "Hear, O lady Mayaná, my mother. From what *siddha* hast thou learnt thy magic arts?"

MAYANA' SPAKE.

364. "Thou askest me from what holy man I have learned my arts. I have learned them from Gorakh Náth himself. 365. I tell thee, learn

thou thy knowledge from Kholá the Hádi." 366. When the king heard the name of a Hádi, he stopped his ears with his hands. For she had uttered an impious word with her tongue.

THE KING SPAKE.

367. "A Hádi is of a vile caste. He cleanseth privies and doth not bathe. Shall I, a king, make obeisance to a Hádi for twenty-two *daṇḍas* !

MAYANÁ SPAKE.

368. "Hear me, my child, speak thy words in a whisper, so that the Hádi may not hear. If he cursed thee, thou wouldest die at once. 369. Thy subjects feed their lamps with oil and ghí : but that Hádi feedeth his lamp with merely Gangá water. 370. As many lamps as there are in the houses of thy subjects, so many hath that Hádi in his little hut. 371. In whosoever house he eateth, to whosoever house he goeth, simply at the word of his mouth he causeth the sea to stop its motion." 372. The king sat in his audience chamber and could not make up his mind. Repeatedly he called his servant Khetu, his younger brother. 373. "Where hast thou gone, my brother ? First would I eat *pán*,* then I would have the *paṇḍit* of the days of my father come to me." 374. Khetu heard these words and made no delay. He hastened towards the *paṇḍit*'s house. 375. "I say unto thee, O reverend *paṇḍit*, and pay thou heed unto my words. The king would see thee in his palace. Haste thee to the hall of audience." 376. He dressed himself in a *dhuṭi* of modest kind. Loosening out his brahmanical cord, so that the threads appeared in pairs, he passed it round his neck. 377. He took his papers relating to the Almanac under his arm, and proceeded to the king's hall of audience. 378. The hall was full, the crowd gave forth a confused noise. At this time did the *paṇḍit*, the son of a *paṇḍit*, present himself. 379. "Incarnation of justice" he said and made obeisance. "Tutelary Deity of my family" said the king making obeisance in return. 380. He called him "Reverend Brother," and made him sit upon the couch. "O reverend Sir, thou art the crest-jewel among prophets. 381. What day will the king sew for himself a beggar's wallet and quilt ? What day will the king shave his head ? 382. What day will the great king besmear himself with ashes ? What day will the pious king pierce his two ears ? 383. What day will the pious king wear nought but a *languṭi* ? What day will I carry a beggar's platter in my hand ? 384. What day will I start for a far country ? Read me aright, and prophesy me this." 385. Taking every precaution to ensure good luck, he produced his Almanac. Such power was there in that Almanac that it could speak itself.

* That is to say, "immediately." Chewing *pán* is such a mechanical and continuous action with a Rangpurí man or woman, that the phrase "to do a thing after eating *pán*", means to do it at once. Cf. vv. 398, 553 and 692.



THE BOOK SPAKE.

386. "On Tuesday will he sew his wallet and his quilt. On Wednesday will he shave his head. 387. On Thursday will he besmear himself with ashes. On Friday the king shall pierce his two ears. 388. On Friday the king shall pierce his ears, and on Saturday shall he put on a *languṭi*. 389. On Sunday the king shall take in his hand a beggar's platter; on that day the king shall set out for a far country. 390. He will take thee from thy home and will give thee advice and hope. For some days he will distress thee in the midst of the forest. Other sorrow will he give thee in the sandy waste. 391. Other sorrow will he give thee in the city of S'rikalá. He will pawn thee for food in the house of Hírā the Harlot. 392. The Harlot's dress will be a linen *sárl* bright as fire. Thy dress, O king, will be a knotted rope. 393. Unsifted rice will she give thee and *brinjals* full of seeds. She will give thee *brinjals* full of seed, and thou wilt burn them and eat them. A pitiless harlot is she; thou wilt be forbidden oil and salt. 394. The harlot will seek the privy, and it wilt be thou who wilt cleanse it. Thou shalt close thy eyes, and proffer her the water of her sin.* 395. Early in the morning shalt thou rise, and she will beat thee with a broom. Thou shalt lift up the bed of her sins, of countless, countless sins. 396. *Bhángi* ropes will she give thee and a *bhángi* stick and two water jars. Twelve loads shalt thou measure out every day."

THE KING SPAKE.

397. "Hear, Reverend Sir. Happiness and misery are written in our destiny. Methinks, I see death written by the Creator in my fate. 'Tis not in two syllables and a half that it can be cancelled." 398. Brother Khetu, where art thou gone? First would I eat *pán*. Then would I give the Bráhmaṇ a present and bid him good speed." 399. He gave him a present and bade him speed. "Make present the barber of my father's time." 400. He went to the *nápit* and called him to the king, saying "Brother, fetch thy razors and come." 401. The hall was full. The crowd gave forth a confused noise. At this time did the barber, the son of a barber, present himself. 402. Even as the pious king saw the barber, he descended from his throne†; and as he did, the theatrum of the temple, and other walled buildings fell to the ground. 403. The forest trees, and the shrubs, the very leaves of the trees began to weep. The forest deer bent their heads

* Not a literal translation.

† The word used is "*pát*". A *pát* in Rangpur is the term used for one of those solid blocks of masonry found here and there in the district. Kings of the olden days are said to have sat upon them, and there to have dispensed justice. One of them, however, (*Harís' Chandra Rájār Pát*, see fig. 3), is almost certainly a tomb.

and wept. 404. At the *ghát* of the *Ghátwál* there were twenty-two *káhans** of ships, and they all wept. Twenty-two *káhans* of ships wept and twenty-three *káhans* of boatmen, and amongst them Vis'ves'var the boatman also wept. 405. The deer-park wept and the children's summer-house. Even the school of harlots wept. 406. The *Tīṭiyá Manjar* wept within its cage. And nine *budis*† of dogs wept as they were hunting. 407. The hospital and the *toshá-khána* wept at intervals. Water-houses, summer-houses and cow-houses‡ (?) wept in countless number. 408. In the elephant stalls, the elephants wept. In the stables, the horses wept. In the throne-room, all the dresses were wet with tears. 409. A hundred cows wept, throwing their tails round the king's neck §; and nine *budis* of dogs wept at his feet. 410. A hundred queens rolled upon the earth and wept. Aduná and Paduná clasped his feet and wept.

ADUNA' AND PADUNA' SPAKE.

411. "Alas, alas, my husband, my wealth. Thou art deserting me. Who now will protect me, and bring me *ghí* and rice to eat?" 412. The king's mother wept with tears falling from her eyes, and they brought a jar of Gangá water. 413. They brought a leaf of a Newáij tree, and they poured water on him from a golden cup. 414. As they poured water on the head of the king, the royal throne quaked. 415. The barber grasped his razor and gazed around. But he received no order to shave the king.

MAYANA' SPAKE.

416. "O barber, towards whom art thou looking? Scorn not thou to shave the head of my darling. Diamonds will I give thee and mounted work; pearls will I give thee as a token. 417. Shave off all his hair, leave only one crown-lock. If thou shavest it off, thereby wilt thou lose thy quilt and wallet." 418. He took his razor in his hand and for a hundred days the king's hair fell upon earth. It became a hairy Gangá and began to flow away. 419. Mayaná uttered "*Tuḍu, Tuḍu*" with a terrible cry, and sixteen hundred *Munis* came down on hearing it. 420. In his chariot of flowers descended Gorakh the Vidyádhara. On a flail came riding Nárada, best of munis. 421. On the back of Vásoyár descended the mighty Bholánáth. On bow and arrow came down Ráma and Lakshmapa. 422. In different directions descended the five Páṇḍava brothers. There

* A *káhan* = 16 *pans* of 20 *gaṇḍas* or 1280.

† A *budí* = 5 *gaṇḍas* or twenty.

‡ The meaning of *gokula* here is unknown to every one whom I have consulted.

§ I know of no other flight of poetry equal to this in the whole poem. I have tried hard to persuade myself that the translation is incorrect; but in vain. The words are too plain to admit of any other meaning.



is no counting the number of Hádi *Siddhas*, with their ears cut. 423. A Hádi hid his face with the dust of cow-dung fuel; and seeing danger at hand, Mayaná began to weep.

THE BURDEN OF HER SONG.

424. "The apple of his mother's eyes. Alas, my child! Who took my own away?" 425. They snatched the razor from the hands of the *nápit*, and gave it into the hand of the ear-cutter. 426. Even as the ear-cutter took the razor in his hand, he cried "*Rám, Rám*" and cut both the ears of the king. 427. They fastened to the king's ear an ear-ring of crystal. They clothed him in a cloth covered with holy symbols. 428. Five Vaishnavas came and dressed the king in a *languṭi*. A *languṭi* with a string did they put upon him. 429. They placed round his neck a *Ráma* rosary. They put into his hand a gourd-platter. 430. A torn quilt, a torn *languṭi*, a torn (heart at) departure. All the followers of Chaitanya were collected near the door. 431. Holy Chaitanya and Nityánanda, also Rádhá, Sítá, and the High Priest of the Vaishnavas sang the Holy Lay. 432. The king's son began to weep, and cried for alms. His servant Khetu gave him alms: elephants, horses, his royal staff and umbrella. Those alms he placed with reverence at the feet of his *guru*.

THE GURU SPAKE.

433. "Depart, depart, O king, I give to thee a boon. Thou shalt go to the three corners of the earth, but shalt not go to Yama's dwelling-place." 434. As the king turned his head to one side, all the heavenly *Munis* returned to heaven. 435. Mayaná bathed herself in five *loṭas* of water, and glad in heart she entered into her own home. 436. In a moment,* she cooked a dish of rice and fifty curries. She touched it, and placed it in a golden dish. 437. She filled a golden vessel with water. "Eat, eat my darling. Happy and light of heart, go thou on thy pilgrimage." 438. When he saw the rice in a (golden) plate, he struck his forehead with his hand, and wept.

THE KING SPAKE.

439. "When I was lord of my kingdom, O my mother, then did I eat rice in many a golden dish. 440. Now I am a beggar, not worth a single *káorí*. I cannot eat from a golden plate." 441. He took a plantain leaf and cut it. Thereon he placed a little rice. 442. He took the shell of a broken gourd and from it he drank a little water. 443. He washed his face and hands with water. Then what did he do? He uttered the words "*S'rí Krishna*" and ate the food. 444. One mouthful, two

* Lit. at a stroke.

mouthfuls, five mouthfuls he ate. Then he looked towards the water, which was trickling out of the broken gourd. 445. He put his face to the earth and sipped up the water, and as he did so Deví's brother S'ani* came over his destiny. 446. S'ani and Ketu took up their abode in the king's heart. And all his body became defiled. 447. Then Mayaná wept in pitiful accents.

THE BURDEN OF HER SONG.

448. "My son is all my fortune. Who will make us meet again. 449. Thou art going to a far country. Thou wilt dwell in the house of a strange woman. First the householder will eat and then he will think of thee. 450. When thou seest an Atíta or a Vaishṇava do not thou despise him. With thy head touching the ground reverence thou him who weareth a rosary. 451. When thou shalt see the mustard plant scanty, and the *dub* grass thin; then wilt thou know that thou art in a far country."

THE KING SPAKE.

452. "If I see a flower, I will not pluck it. If I see a bird, I will not sling a stone at it. 453. If I see another's wife, I will not smile at her. First I will call her mother, then will I ask for alms." 454. She put sixteen *kahans* of *káorís* in his wallet. "See that thou tellest not thy guru about these *káorís*." 455. "In dust and ashes will I spend the money. Following the Háḍi will I go to Yama's abode."

456. The hundred queens went to Khetu. But Aduná and Paduná went to their own palace. 457. In that palace, there were guards in twelve places, and thirteen *thánás*. No Atíta or Vaishṇava was allowed to enter that house. 458. And e'en as the two damsels entered their dwelling-place, the doors of virtue shut themselves without keys. 459. They set themselves to play at dice in silence.

THE QUEEN SPAKE.

460. "What day the dice will fall from my hands in disorder, I shall know that that day my husband is dead."

461. The burden of the kingdom remained in the lap of Mayaná, the king's mother. And the Háḍi and the king started for a city in a far country. 462. One *kroś*, two *kroś*, five *kroś* he went. And the king's feet were cut and covered with blood.

THE BURDEN OF HIS SONG.

463. "Alas! Fate, sitting in a lovely place, hath written misery on my destiny." 464. One day, two days, seven days passed. Night and

* S'ani and Ketu of course mean ill-luck. If, however, by "Deví" is meant Durgá, she is certainly not S'ani's sister.

day he journeyed on. 465. So the king left his home and went to another country, and the Háḍi said, "Glory to fate. This is the fruit of my destiny."

THE HA'DI SPAKE.

466. "A proud word did the king speak concerning me. Verily, in a short space, I will bring him into trouble." 467. "*Tuḍu, Tuḍu*," cried he, with a terrible voice; and in the atmosphere that wondrous Háḍi created a forest. 468. They passed through a small forest, and came to a great one. The spittle in the king's mouth was dried up, nor could he speak. 469. In the vacant atmosphere the Háḍi went along. While the king toiled slowly along, thrusting the *jāngal* aside with his hands. 470. Prickles pierced him and thorns pierced him. His blood poured forth in streams. He could not travel further, and (in despair) the king struck his forehead with his hand.

THE BURDEN OF HIS SONG.

471. "To whom shall I tell my woes. Even my guru hath become pitiless." 472. More pangs he gave the king. He took him through a sandy waste. At the king's tears the Háḍi's heart was touched, and he created a pleasant Kadamba tree upon the road. 473. The king went to a place deep (under the foliage) by the foot of the tree, and sleep came upon him in handfuls.

THE KING SPAKE.

474. "What with ploughing through water, and what with ploughing through sand, I have undergone great hardships. Place thy left thigh upon the ground, that I may rest awhile. 475. The Háḍi laid his left thigh upon the ground, and the king rested his head upon it and fell asleep. 476. The Háḍi cried "*Tuḍu, Tuḍu*" with a loud voice, and summoned an hundred Yamas.

THE HA'DI SPAKE.

477. "Hear, O ye Yamas, take heed unto my words. Build ye a road from hence to Daryápur, seven cubits broad and chest high." 478. The Yamas heard his words, nor did they delay. They departed to build the road. 479. From thence to Daryápur they built the road, seven cubits broad and chest high. 480. "*Hanumán*" he cried with a loud voice, and made them plant trees at intervals along the road. 481. He smote the king with a slap like a thunderbolt, and crying "Guru, Guru" the king arose, weeping.

THE HA'DI SPAKE.

482. "I have built a road with great labour. Give me twelve *káoris*, that I may buy happiness and enjoy myself. 483. I would buy and eat



twelve *káorís* worth of *gánjá*: then will I take thee on to Ghádapur." 484. When the pious king heard these words, he closed his ears, and cried "Rám, Rám."

THE KING SPAKE.

485. "I know nought of such a thing, O father guru. He who goeth with such a transgressor, will surely die. 486. Nay, nay, there is no need of binding me. Instead of twelve *káorís* take twelve *káhans*, and return unto thy house." 487. The Hádi was in contemplation and suddenly started. 488. He went into contemplation and gazed about, and in his contemplation his eyes fell upon the sixteen *káhans* in the king's wallet.

THE HA'DI SPAKE.

489. "His mother excelleth me in charms. She hath put sixteen *káhans* of *káorís* in his wallet." 490. He cried "*Tuḍu, Tuḍu*" with a loud voice, and took the sixteen *káhans* of *káorís*, and flew up into the sky. 491. He created two stones weighing half a *man* each, and put them into the wallet. And the pious king took his *bhát* and began to eat. 492. "Give me, give me the *káorís*," he began to coax. But after saying so twice or thrice, he became angry. 493. The king opened the wallet and became amazed. Wonderful thing! No *káorís* were within the wallet.

THE BURDEN OF HIS SONG.

494. "Why do my eyes dance in my head? I know not what is written in my fate. 495. Why, why, O father guru, hast thou wrongfully given up pity? In my wallet there are no *káorís*. Give me, unhappy one, in pawn for the *káorís* I have promised." 496. Immediately the Hádi called his mother-earth to witness. "I call thee to witness, that he himself hath offered himself in pawn. 'Tis not the Hádi who hath given him." 497. He put the pious king in his wallet, and took him to the city of Dar-yápur.

THE HA'DI SPAKE.

498. "A man for pawn, a man for pawn. Take him, O mother, thou seller of milk. I would pawn him for twelve *káorís*. I wish to get twelve *káorís* to eat *gánjá*."

THE GOWÁLÍNÍ SPAKE.

499. "See, see, we would see what kind of pupil this is of thine." 500. He pulled the king out by one hand, and the king arose radiant in person.

THE GOWÁLÍNÍ SPAKE.

501. "I perceive that he is of beautiful form and accustomed to eat royal food.* Can such as he eat in the house of a Gowáliní? 502. Fill up my milk-pail with money, and fill up thy wallet again. Leave my quarter of the town, and go thou elsewhere." 503. He seized the king by the hand, and wandered about amongst the shop lanes. 504. "A man for pawn, a man for pawn, O mother, thou seller of crushed rice" and as soon as the crushed rice-seller saw the king, she upset her stall of crushed rice. 505. She clasped him round the waist, saying, "I die (of love for thee)"; and with great difficulty the king separated himself from her. 506. "A man for pawn, a man for pawn, O mother, thou seller of turmeric. A man for pawn, a man for pawn, O mother, thou seller of *ság*. 507. A man for pawn, a man for pawn, O mother, thou seller of vetch. A man for pawn, a man for pawn, O mother, thou seller of pease." 508. And as soon as the seller of pease saw the king, she immediately called her own husband her father. 509. She upset her stall; she caught the king by the waist exclaiming "I die." 510. The crushed rice-seller arose and said to the pease-seller "You get away. Let go the waist of the king. I first caught hold of him." 511. They both caught him by the waist and began to pull; and of a sudden the king began to weep. 512. The Hádi felt pity at the tears of the king, and called on Indra with a loud cry. 513. With great noise, hail began to fall in the *bazár*. And they let go the king's waist, and every one went to her house. 514. "Don't stop up the door, don't stop up the door, O sister, seller of pease. Don't you see that I'll catch my death out here in the wet"? 515. And when the seller of pease heard that word, she made a great fuss, and left the door free for passengers. 516. The Hádi took the pestle for pounding pease, and with it began to pound the king. 517. He cut the king's nose, and his hair, and made proclamation by beat of drum. He put his hand upon the king's neck, and pushed him out from that *bazár*. 518. He left that locality, and went to Vijaya the ploughman, and stopped before him. 519. "A man for pawn, a man for pawn, O house of a *halwá*." 520. "Outwardly† he is of comely form. How can he eat in the house of a ploughman? 521. Fit for him is the house of Hírā, the harlot; but how wilt thou go within her house? 522. She hath hung a pair of drums by her door, and if the king of any quarter come to her abode, 523. And if he strike the drum one blow, she will demand a thousand rupees at the door." 524. Vijaya went away with them, and showed them the harlot's house. 525. He took down the stick and smote the drum, and by its sound his arrival was made known in the house of the harlot. 526. She

* Lit. "a king over his *bhāt*."

† Lit. over the vessel.



began to call to her maid-servant. "The king of what country has now come? Allow him to enter, and fan him with a *chámara*." 527. The maid-servant heard her, nor did she delay, but went into the presence of the Háḍi.

THE MAID-SERVANT SPAKE.

528. "Why, Reverend Sir, hast thou come so far a distance? Why hast thou left thy throne, to lie upon the earth?"

THE HA'DI SPAKE.

529. "It is not bamboo oil vessels, nor *bazár* cups that I carry in my wallet. Herein have I a pupil. 530. I would pawn him for twelve *káorís*, to buy *gánjá* that I may eat. 531. Will Hírá, the harlot, take him in pledge?"

THE MAID-SERVANT SPAKE.

"Let me see, let me see what sort of pupil he is." 532. He pulled him forth by one hand, and the king arose radiant in person.

THE BURDEN OF HER SONG.

533. "On seeing his beauty, my eyes run with tears." 534. The maid-servant told the harlot what she had heard. "The king is more beautiful in his feet than thou art in thy face. 535. The king for whom thou hast been offering sacrifices these twelve years; him thou hast found at thy very door." 536. On hearing this, the harlot did not delay, but went before the king.

THE HA'DI SPAKE.

537. "Hear, oh harlot, what I have to say unto thee. A good pupil is this whom I would pledge with thee. 538. I would pledge him for twelve *káorís*, that with them I may buy *gánjá*." 539. On hearing this, the harlot did not delay, but sent to the *bazár* for a *sáud* banker. 540. She collected the paper and pens and counted out twelve *káorís*. 541. In a clear voice, the Háḍi told the banker to write, and he wrote the year, the date, and the word *S'rí* on the paper. 542. He wrote the name of Hírá, the harlot, on the paper and also the twelve *káorís*. 543. He wrote the name of Dharma on the paper, and threw the pen to the Háḍi. 544. And when that mighty Háḍi took the pen in his hand, he uttered the words "Rám, Rám" and made his signature. 545. She counted out the twelve *káorís* and gave them to the Háḍi, who on his part made over the king to the harlot. 546. And from the day that the Háḍi gave the deed into the harlot's hand, the king lay pawned with her. 547. The Muni Háḍi tightly tied up the passions of the king and made him neither a woman nor a man. 548. When Hírá, the harlot, turned her head to one side, he

buried the twelve *káoris* in the earth. 549. And when the pious king turned his face away, he turned himself into a golden pumpkin and went to the regions of Pátála. 550. Beneath fourteen fathoms of water he took his magic seat, and for twelve years he stayed there in contemplation. 551. When the king turned round again, and could no longer see his Guru, he began to weep.

THE HARLOT SPAKE.

552. "O king, why dost thou weep? For thy sake I have been doing penance these twelve years. 553. Where art thou gone, my maid-servant? Bring me *pán* to eat* and then bathe the king, and make him put on all the radiancey he can." 554. The maid-servant brought the king after bathing him. The harlot well knew how to spread a bed. 555. Over a coarse mat she spread fine mats as high as the chest, and over all she laid an *indra-kambal*.† 556. She made ready cloves, nutmegs and camphor for eating: so much, that there would be no counting the number of times the king would spit. 557. As soon as the pious king entered into the room, she took him in her lap, and sat him on the bed, and offered him a vessel of *pán*. 558. "Eat a *khili*‡ of *pán*, and eat a single betel-nut, O king. Lift up thy head and gaze upon this luckless harlot." 559. The king was pleased in his heart when he saw the cloves, nutmegs and camphor, and at one time she gave him four or five *khilis*. 560. Once, twice, and thrice he bruised the *khili* in his fingers, and then the warning of his mother came into his remembrance. 561. "Thou art going to a far country. Thou wilt dwell in the house of a strange woman. First the householder will eat, and then he will think of thee. 562. When thou seest an *Atíta* or a *Vaishnava* do not thou despise him. With thy head touching the ground, reverence thou him who weareth a rosary. 563. If thou seest a flower, thou shalt not pluck it. If thou seest a bird, thou shalt not break its eggs. 564. If thou seest another's wife, thou shalt not smile at her. 565. When thou shalt see the mustard plant scanty, and the *dub* grass thin, then wilt thou know that thou art in a far country." 566. When the words of his mother came into his mind, the king cried, "Rám, Rám," and flung the *khili* of *pán* away. 567. Thereupon the harlot became angry, "Why, O king of kings, dost thou not eat the *pán*? For thy sake I have been doing penance these twelve years." 568. She took five *khilis* in her own hand, and put them in the pious king's mouth, but he cast them out, saying "*thu, thu*." 569. As the king moved

* See note to v. 373.

† A kind of blanket.

‡ See note to v. 53.

from place to place and sat down, the harlot followed him and sat close up to his body. 570. She began to scatter white and red sandal-wood over his body, but the king began to call her "Mother, mother", and she replied "My heart doth not let me, O king, be called 'mother' by thee." 571. The harlot placed the king's hand upon her heart, but he called her mother, and asked her to suckle him. 572. Once, twice, and thrice the king became angered. He even three or four times abused the harlot.

THE BURDEN OF HIS SONG.

573. "I tell thee the words of thy heart. Unholy is such love. Vainly hast thou lit thy wax candle, and passed a waking night. I am blessed by Ráma; and Kubujá was not (loved by Krishna) as Rádhá was. 574. A harlot hath no loveliness within her, her beauty is nought but copious locks of hair. She is but a gift fit for a barber, like the *dhatúrá** flower. 575. I see a harlot's dealings to be like a ferry-boat. Men pay *káorís* at the landing-stage, and pass over. 576. I see thee, O harlot, to be like traffic in things of no value. Thy beauty is like that of a dark well. Low caste *hádis* and *doms* as well as bráhmans, bathe (to wash off the defilement) after touching thee." 577. For four watches, the harlot argued, but still the pious king addressed her as "Mother." 578. Once, twice, and thrice did the harlot become angry, at last she kicked the pious king off the bedstead. 579. She called for her maid-servant, who turned the king out with her hand on his neck. 580. The harlot's dress was a linen *sári* bright as fire; but the king's became a knotted rope. 581. Unsifted rice and brinjals full of seeds she gave him; brinjals full of seeds, and he burned them, and made chutney of them. A pitiless harlot was she; she forbade him salt and oil. 582. In the cold month of Mágh, she gave him an old tattered *sári*, and a goat hut to live in. 583. *Bhángi* ropes she gave him, and a *bhángi* stick, and two water-jars. Twelve loads of water did he measure out the livelong day. 584. If one amongst the twelve was not supplied, in payment for it seven men would beat him. 585. He took *bhángi* ropes and a *bhángi* stick and two vessels of water; and he went to fill them at the Karátóyá river. 586. One, two, or three loads he filled. The whole day the Mahárāja was carrying the twelve loads. 587. Seven vile men seized the king and laid him on his back and then the harlot would put on her feet golden pattens. 588. Hírā, the harlot, after bathing would laugh gleefully, and proudly stand upon the king's chest. 589. After bathing her body, she shone with excessive brilliancy, and she took off her wet clothes, and put on a dry linen *sári*. 590. The wet clothes she would wring out over the king's face. At midday the king would cover his face and

* Fair to look upon, but has no scent.

weep. She then would seize him by the neck and thrust him out. 591. What with to-day and what with to-morrow twelve years passed. 592. He took *bhángi* ropes and a *bhángi* stick and two water-jars, and went to draw water at the river Karátoyá. 593. On the bank of the river, the king became giddy and fell into the river. "Alas! I heard not the words of Aduná and Paduná, and have lost my life through attending to the voice of an old mother."

594. Even as the pious king mentioned the names of the damsels, the dice fell from their hands in disarray. And lamentably they began to weep. 595. "Twelve years have passed and my husband doth not let his voice be heard, and now the thirteenth year has come. 596. To-day why have the dice fallen in disorder? Of a surety my husband is dead and gone."

THE BURDEN OF HER SONG.

597. "My love, how may I go forth? To-morrow at dawn and in a lonely place will I tell thee the tale of my woes. He playeth his pipe in Vrindávana: and my heart saith unto me, let me go and see Kṛishṇa." 598. The two sisters went out to the theatrum of the temple in tears. And a jay and a parrot from their cage heard them weeping.

THE JAY SPAKE.

599. "O parrot, my elder brother, let us see why our mother weepeth." 600. They united their strength and burst the bars of their cage, and through the broken walls they flew away. 601. After resting* for a moment on the straw of the thatch, they each alighted on the arm of the damsels. "Why, why, mother, art thou crying in the theatrum?" 602. The damsel said, "Listen to me, ye two dear birds. Your father should have returned according to his agreement after twelve years. It is now the thirteenth year and he hath not come. 603. Why did the dice fall in disorder from our hands? Of a surety I believe that your father is dead and gone." 604. "Mother, let us two loose. We will search where our father is." 605. "Speed ye, speed ye, my pretty children, to a far country, and find out where your father is." 606. The birds made obeisance at the feet of their mistress, and flew away in a southern direction. 607. For seven days the birds flew, but found no trace of the king. 608. On the banks of the river there were a banyan and a píppal tree, and the birds flew and rested on a branch of the banyan tree. 609. The birds flew from the western branch to the eastern branch, and underneath them passed the king bearing his burden. 610. He descended into the water and cleansed his teeth, and over his head the birds began to hover.

* Lit. Scratching.

THE BIRDS SPAKE.

611. "Art thou the king Gopí Chandra? We two brothers have come for news of thee." 612. He stretched forth his arm, and the two birds settled down upon it. 613. The eyes of the king flowed with affection, as he commenced the tale of his woes. 614. He plucked the leaves of some wild plants (that grew by), and with his teeth he mended a reed pen. 615. He cut his left thigh with his little finger, and wrote a letter with the blood. All his woes he wrote within it. 616. "If thou art a good mother, thou wilt rescue me. If thou art a bad mother, thou wilt leave me in sin." "This letter give ye to your grandmother." 617. The birds made obeisance to the king and flew off to Mayaná's abode. 618. They made a hole in the roof and threw in the letter "See, see, oh Grandam, see if thy head* is in this?" 619. If thou art a good mother thou wilt rescue him." 620. She opened the envelope and began to read: and lamentably the birds began to weep.

THE BURDEN OF HER SONG.

621. "My son left me in the morning. I fear that he hath died in the fierce heat of the sun." 622. Mayaná went into contemplation and gazed around, and her eyes fell upon the Hádi sitting beneath fourteen fathoms of water. 623. She brought into play her magic art called *kharupá* (or cutting), and she cut away the Hádi's seat of contemplation and himself. 624. He began to float away through the cold sea; but Mayaná seized him by the hair and pulled him on land. 625. She struck him a slap forcible as a thunderbolt; and the Hádi who was still in contemplation got up with a start. 626. In his contemplation the Hádi gazed around, and his eyes fell upon Mayaná. 627. "O sister, I am going to the king. I will first rescue thy son, and then will I eat my *gánjá*."

MAYANA' SPAKE.

628. "If I find that my son hath learned only a few charms, I will burn thee, O Hádi, to ashes, and send thee to Yama's house." 629. The Hádi started, and arrived at the *ghát* where the king was sitting. 630. As soon as the king saw the Hádi's face, he laid down the two water-jars and broke them. 631. He divided his hair in the middle and fell at the feet of the Hádi. 632. Thereupon the Hádi put him into his wallet and carried him off to the harlot's house. 633. When he arrived there, he uttered a loud cry, and the whole city began to quake with a rumbling noise. 634. The harlot said to her maid-servant "Daughter, see who it be. If it be a beggar, send him away." 635. The maid-servant hastened to the door and when she saw the Hádi she returned to her mistress. 636.

* i. e., if this concerneth thee.

She said unto the harlot, "It is not an Atíta, but the Hádi the lord of Lanka." 637. When the harlot heard this, what did she do? She went inside the house and hid herself. 638. The harlot said to herself "I am hidden." But the mighty Hádi saw her by his power of contemplation, and grasped his staff. 639. "I tell thee my staff, and pay thou heed unto my words. Bind Hírá, the harlot, and bring her forth." 640. The staff received one order as if it were a thousand, and with a roar it entered the harlot's house. 641. It thrust the harlot forth, and then the Hádi took up the twelve *káorís*. 642. The harlot brought forth the deed executed twelve years ago, and he counted into her hands the twelve *káorís*. 643. She gave the deed into his hand, and the Hádi said, "Rám, Rám," as he tore it up. 644. The Hádi brought a cauldron of Ganges water, and seven vile men seized the harlot and threw her on her back. 645. He put on the king's foot pattens weighing twenty-two maunds, and stood the king upon the harlot's breast. 646. As he swayed upon her in mounting, he crushed the harlot's thirty-two ribs into small pieces. 647. As soon as the Hádi sprinkled water on the king's head, saying "Rám, Rám," all his sin was put away from him. 648. After bathing his body, he shone with excessive brightness, and he took off his wet clothes and put on a dry linen *dhuṭi*.

THE HA'DI SPAKE.

649. "O prince, pay heed unto my words. For twelve years the harlot hath done penance in her house. Do thou fulfil to some extent her desires. 650. Go forth, O Hírá the harlot, I give to thee a boon. Become a bat within the kingdom." 651. The Muni's word was not spoken in vain: she became a bat, and flew up to heaven. 652. He caught hold of the harlot in his left hand, and divided her into two parts. 653. The forepart flew up to heaven, but he cast the rear-part into the sea. 654. As she fell into the sea she cried "*dohái*."

THE HA'DI SPAKE.

655. "Go forth, O Hírá, thou harlot, I give to thee a boon. Become a minnow, and dwell within the water. 656. Go forth, go forth, O Chápái, thou maid-servant, I give to thee a boon. Become a harlot, and live within the kingdom. 657. In thy youth earn thy living out of the work of thy caste; and in thy old age, take a *páik* for thy husband. He will beat thee and kick thee and break thy thirty-two ribs. 658. Go forth, O wealth of Hírá, I give to thee a boon. Come into the town of Kholáháti, and be a petty *basár* made of tiles." 659. He utterly destroyed Hírá's house, and then took the king away to teach him magic arts.



THE HA'PI SPAKE.

660. "I say unto thee, O king, and take thou heed unto my words. Go thou into the market and beg for alms. Let us sit together, as *guru* and disciple, in the town of Pardá."

THE KING SPAKE.

661. "I am a king's son, and have become a Brahmácháří. How can I beg? I know not how to do it." 662. So the Háđi gave him three or four directions, and the king took a platter in his hand and went to beg.

THE HA'PI SPAKE.

663. "Victory to fate, this is the fruit of my works. I have in my house a pupil, beautiful in every limb. He will drive the daughters-in-law and the daughters of the householders mad. 664. He changed himself into Nengadı the *Kotwál* and went about fastening the door bars in every house. 665. He is bending forward entreating for alms, and they are setting the dogs at him. He will not get any alms, and will return to the Háđi." 666. The king went about begging, but the Háđi cried out with a loud voice. 667. And from heaven there came down at his call five damsels, who placed five dishes of food before him. 668. He ate his own share, and put aside that of the king with care, and in it he put two and a half times sixteen scores of charms. 669. He mixed it with spittle and phlegm, and added to it the juice of refined* sugar. *Sáíl* seeds, *kela* seeds and *durá* seeds he added to the mess. 670. Meanwhile the pious king went about crying for alms. 671. He bent forward entreating for alms, and they set dogs at him. He was unsuccessful in his quest, and returned to the presence of the Háđi.

THE KING SPAKE.

672. "O *guru*, the people of thy country I have seen to be pitiless and stony-hearted. They gave neither alms nor charity, and set the dogs at me."

THE HA'PI SPAKE.

673. "Thou hast not obtained alms. It mattereth not, my son. Accept the leavings of my food. I met a pious woman on the road. 674. She gave me a little rice. I have eaten my share, and carefully put some aside for thee." 675. With tottering steps the king drew near the food. And when he saw it he struck his forehead with his hand. 676. A rice which my dogs would turn aside from; such have I, a king, come to eat. 677. "*Tuđu, Tuđu*," said the Háđi with a great voice; and the king felt an-hungered as if he had fasted for twelve years. 678. He took

* Lit. covered.

his first mouthful with expressions of disgust, but it came to his taste like sweet ambrosia. 679. When again he put forth his hand to take a mouthful, he snatched at it, thrusting aside the Hádi's hand, and took two and a half mouthfuls at once. And therefrom he learnt two and a half times sixteen scores of charms. 680. By his charms in his meditation he bound up his top-knot as a woman ties it, and embraced the mother of Godá Yama. 681. By his charms, in his meditation, he tied up his top-knot as a man ties it, and lamed Godá Yama himself. 682. The Hádi uttered the words "*Tuḍu, Tuḍu*" with a loud voice and thereupon the affairs of his home came in the king's remembrance.

THE KING SPAKE.

683. "Give me leave, O guru, and let me journey forth in the bark of virtue. Travelling in a chariot of light, would I see my wife and home, and then return to thee." 684. He placed his staff in the hands of the king, who thereupon fell at the feet of the Hádi. 685. The king carried the stick over his shoulder (although it weighed) eighty maunds; and started off for his own home. 686. The mighty Hádi laughed aloud, and the king left him and started on his journey. 687. He reached his palace, and cried "*Tuḍu, Tuḍu*" with a roar like a lion. The damsels were asleep but now awoke. 688. Without being struck, the gongs at the gate sounded; and without fire being applied, milk and rice began to boil. 689. In all the little *bazárs* the lamps began to blaze. The king began to float in a sea of delight.* 690. A swarm of bees flew up around his head. The king saw the delights of holy Vṛindávana before his eyes. And all pregnant women gave birth to their offsprings.

THE QUEEN SPAKE.

THE BURDEN OF HER SONG.

691. "A pilgrim hath come, and standeth in my door. 692. Where is the maid-servant. I would first eat *pán*,† and then (would I enquire) whence the pilgrim hath come, and dismiss him." 693. The maid-servant made ready alms. 694. "Take alms, O reverend pilgrim, I am the maid of a householder, and would return within the house."

THE KING SPAKE.

695. "I am a pilgrim from the south: I call myself a Brahmáchári. I cannot take alms from the humble hands of a maid-servant. 696. If a lady give me alms, then this pilgrim's son can take it."

* Lit. coldness.

† See note to v. 373.



THE MAID-SERVANT SPAKE.

697. "Wait awhile, O pilgrim, thou who sittest and beggest shamelessly. Long will it be before thou obtainest alms, even though thou criest for them." 698. The maid-servant went weeping to the damsel. "He is a pilgrim from the south, and calleth himself Brahmáchári. 699. He taketh not alms from the hands of a maid-servant, but saith, 'Let the ladies give me alms.' " 700. When the two damsels heard this they took alms and arose. Behold, without a key the door opened of itself. 701. Aduná and Paduná went out with the alms. "Take alms, take alms, O reverend pilgrim. We are the daughters-in-law of a householder, and would return within the house."

THE KING SPAKE.

702. "I am a pilgrim from the east. My name is Brahmáchári. I cannot take alms from the hand of a woman. 703. If the umbrella* that shadeth thy head can give me alms, then can this pilgrim's son accept them." 704. The ladies pointed out the ring upon his finger. "We see a woman's ring upon thy hand. 705. Thou art the umbrella of my head. Thou art a pilgrim, and I am a pilgrim, pupils of one guru."

THE KING SPAKE.

706. "One evening I stopped at a house, and they gave to a man *thákari kálái dāl* and *áus* rice. 707. He ate it greedily, and was attacked with cholera and died. 708. First one man took something† off his body, and then another; and as my share they gave me these two rings."

THE QUEEN SPAKE.

709. "Where is my maid-servant? First will she eat *pán*.‡ Then shall she cut the rope which ties the elephant. 710. If this be my husband, he will recognize him. If he be a pilgrim from the south, he will trample him to death." 711. She cut the elephant's rope, and the elephant came from a distance. 712. While yet afar off he made obeisance to the king. And when he approached, he lifted him on to his shoulder with his trunk. 713. The elephant awaited awhile and stood steady, that the damsels might approach. 714. The king descended from the back of the elephant, and the damsels took him by the hand and led him within the house. Amid laughter and jokes, they began to speak familiarly with him.

* *I. e.*, thy husband.

† So explained to me. It means literally, "First one gave a blow, and then another gave the last blow."

‡ See note to v. 373.



THE QUEEN SPAKE.

715. "How hath the Guru taught thee magic arts? Let us see how thou wilt approach thy mother." 716. He changed himself into a golden bee, and flew to his mother's palace. 717. He appeared in Mayaná's house, and, uttering a loud cry, made her spinning-wheel fly up into the air. 718. But Mayaná also was skilled in charms, and with a jump she seized the spinning-wheel by its head.

MAYANA' SPAKE.

719. "Come, come my son, the darling of an unhappy one." 720. The king divided his hair and fell at the feet of his mother. 721. He sent for Mathu the barber. He began to clear off his vow,* and the Bráhmans came, and collected materials for sacrifice. 722. The king began to perform the celebration of the office of *sankirttana* and gave away the contents of seven barns in charity. 723.† He himself crossed the Vaitarani on the tail of a cow, and his ancestors crossed (the river of life) into paradise. 724. Mayaná bathed herself with five *lotas* of water, and laughing returned quickly‡ into the house. 725. After cooking a dish of rice and fifty different curries, she cleaned three (brass plates) with tamarind juice. 726. Mayaná summoned the Háḍi with a loud voice, and he immediately came and stood before her. 727. The first plate she gave to the Háḍi. The second she took herself, and the third she gave to the king. 728. After washing their hands and mouth, what did they do? They uttered the holy name of Kṛishṇa, and, beginning their meal, ate one, two, and five mouthfuls each. 729. After eating and drinking, their hearts were glad, and they washed their mouths with water from a golden vessel. 730. Then the Háḍi, who came from paradise, placed his feet on the head of the king, and returned to his own place. 731. They cleaned the king's throne; and Hanumán took the staff and umbrella of royalty, and marched about; and the throne-elephant approached dressed in his trappings. 732. The king clothed himself magnificently, and the elephant mounted him on his shoulders by his trunk. 733. He took the king to the throne, accompanied by the music of drums and trumpets; and bowed himself down before it, and with his trunk placed him upon the seat. 734. Then the king immediately fixed the land revenue at one and a half scores of *káoris*, (as it had been in old days) and ever since reigned happily within his kingdom.

* By cutting his nails and hair which he had allowed to grow.

† This is most essentially a "*Satya yuger kathá*." What does it mean?

‡ Lit. At a bound.

APPENDIX.

The following are the lines referred to in the note to verse 264. I give them as an example of the very peculiar nature of the dialect. It is difficult, and requires a very literal translation, which I give.

The word for “fresh butter” appears in two forms,—ननि and नवनि ; and it is worth noting how the latter has remained almost unchanged from the time of the *Aitareya Bráhmaṇa*.*

श्यामर वांशीरे मन मजालुरे ।
 रया २ नयान भोरे ॥
 माय वलेरे यादु उत्तरे ।
 गभिन पुष्पर पालङ्क ।
 पेले पार कत निन्द ॥
 मायूर वचने यादु उठिया वसिल ।
 मेसिते ना पारे आंखि घसिते लागिल ॥
 यादु गेल छिनाने यशदा रल घरे ।
 एखिना नवनि वाटे घरे २ ॥
 छिनान करिया घरे नागि याय ।
 उत्तम सिद्धमन वसिते दिल माय ।
 आनन्दित हया यादु चिर ननि खाय ॥
 चिर ननि खाया यादु तुष्ट हलो मन ।
 उत्तम भिङ्गार जले करे आचवन ‡ ॥

O the pipe of S'yám (Kṛishṇa). My mind whirls, my eyes continually run with tears. The mother said “O Yádu, how art thou sleeping on the deep bed of flowers in the north?” Hearing the mother's voice, Yádu sat up ; he could not open his eyes, and began to rub them. Yádu goes to bathe ; Yasódá remains in the house, and divides out this rice-milk and fresh butter.

After finishing his bath, he goes towards the house—his mother gives him a grand throne to sit upon ; being pleased, Yádu eats the milk, and the fresh butter.

After eating the milk and fresh butter, Yádu's mind becomes satisfied ; and he washes his mouth with water in a grand golden pot.

* Ait. Br. I. 3. नवतीतेनाभ्यञ्जति ॥

† एखिन = ए चिर ॥ ‡ आचवन = आचमन ॥



The Lokanīti translated from the Burmese Paraphrase.—By LIEUT. R. C. TEMPLE, B. S. C., *Offg. Wing Officer, 1st Goorkhas.*

INTRODUCTION.

There is probably no book so universally known to the Burmese as the Lokanīti, pronounced in Burmese Lawkanīdi. It is read in all schools of any standing whether they belong to the Government or to enterprising Hpōngyis or Priests. It has been copied into hundreds of palm-leaf MSS with more or less accuracy according to the learning of the various scribes, and about five years ago the Roman Catholic Missionaries published it at Bassein in Burmese and Pāli, and soon afterwards the Government itself published an edition of it in Burmese and Pāli in an issue of 10,000 copies. The book is as its title signifies a collection of Proverbs or Maxims on subjects of every day life, and as it now stands, is not I think of any great antiquity. It has a semi-religious character which it bears in common with many Buddhist works of a similar nature, and seems to belong to a series of books of Proverbs, though of very different dates to it, which are known respectively to the Burmese as the Dammanīdi, Yāzanīdi, and Lawkanīdi, *i. e.*, Books of Proverbs concerning the Law and Religion ("the Law" having much the same signification to a Buddhist as it had to the Jews of the Bible), the King and Common Life. These titles are in Pāli respectively Dhammanīti, Rājanīti and Lokanīti.

I was never able in Burmah to find out much about the history of this book which is professedly merely a collection of passages from older religious works, although I have personally and through the kindness of several friends made many enquiries from the Burmese Sayās or learned men. According to one account, it was written originally (date unknown) in Sanskrit (? Pāli) by the Pōngnā (Brahman) Sānnēkgyaw (Burmese name) and paraphrased into Burmese in 1196 Burmese Era (= 1826 A. D.) by the Hpōngyi U Pōk of the Mahā Oung Myē Bōng Sān Ok Kyoung (the Great Brickbuilt Monastery in the Sacred Place) at Ava. This U Pōk's name as priest was Sēk-kān-da-bi, to which the king of Ava added the titles of Thiri Thāddamma-daza, Mahā Damma-yāza Guru, (= Sanskrit, Sri Saddharmadhaja, Mahā Dharmarāja Guru) or the True Teacher of the Law, the Great High Priest, Master of the Law. Again one of my correspondents writes that the author was a priest "with no very extraordinary knowledge of Pāli" who either collected the maxims from old books or what is more probable collected some of them and added others of his own composition. This opinion is corroborated by the unequal merit of the original Pāli verses, and by the many grammatical and other errors observa-

ble in them even upon a superficial examination. Lastly in one of the MSS. in the Bassein District there is a preface partly in Burmese and partly in Pāli, according to the usual custom, which was forwarded to me. This contains much the same information as the account above given, and is almost identical with what is given as the last or 165th sloka of the Government printed edition of the Lawkanīdi, a rendering of which will be found at the end of the following translation of the whole work. From these sources of information it is difficult to tell whether the book was compiled or only revised by the Hpôngyī Sôkkândabī, but I think the latter is probably the correct assumption.

The Lokanīti is divided into seven khandas or chapters, each containing a series of proverbs on the subject of the chapters. These subjects are (1) the Wise, (2) the Good, (3) the Wicked and Foolish, (4) Friendship, (5) Women, (6) Kings, (7) Miscellaneous Subjects. In the first of these chapters, and in fact throughout the whole work, there is a strong religious element, but they contain at the same time many spicy bits of shrewd worldly wisdom, while the quaintness of the similes with which the proverbs abound should I think of themselves attract attention.

In reading the rendering of this book it must be borne in mind that it is a Buddhist work, and that such words and expressions as "the truth," "the Law," "God," "angels," "the world to come" and so on, have a Buddhist and not a Christian signification. However, it bears so strong a resemblance to our own "Proverbs of Solomon, the son of David, King of Israel," that I thought it advisable to translate it into Biblical language, deeming that the Buddhist mode of religious thought would be more forcibly brought before English readers by that than by any other mode.

Lastly, when making the following translation in 1875, I had the assistance of Moung Shwê Thâ, a well-known "Munshi" of Rangoon.

THE BOOK OF THE PROVERBS OF COMMON LIFE.

*Glory be to him that is blessed, that is holy, that is the Author of all Truth.**

CHAPTER I.

1. Making my obeisance to God,† the Law, and the Assembly of the Perfect,‡ I have written in one book, called the Book of the Proverbs of

* This is the usual heading of Buddhist books. In Pāli it runs as follows: "Namo tassa bhagavato arahato sammā Sambuddhassa."

† Or Buddha or the All Wise.

‡ Or to the Three Precious Things. The "Three Precious Things" are (in Pāli) Buddha, Dhamma and Sangha, which are translated by Childers in his Khuddaka Pāṭha as Buddha, the Law, and the Church.

Common Life, many things from out of many holy books ; which things I have briefly set forth in the language of the Scriptures.*

2. The Book of Proverbs that speaketh of divers matters is unto man as an heart ;† as father and mother, as a teacher, as a friend ; therefore he that knoweth this book is as one that hath seen and heard much and becometh excellent and wise.

3. He that is idle from whence shall he obtain knowledge ? He that is without knowledge, from whence shall he obtain riches ? He that is without riches, from whence shall he obtain friends ? He that is without friends, from whence shall he obtain happiness ? He that is without happiness, how shall he do well ? He that hath not done well, how shall he attain unto the perfect state ?‡

4. There is no wealth like unto knowledge, for thieves cannot steal it : in this world knowledge is a friend and leadeth unto happiness in the world to come.§

5. Think not the wisdom that seeth and heareth a little thing, and ponder this in thy mind. It is a drop of water that falling often times on an ant-hill filleth it.||

6. Think it not a small thing to be learned in thy books or with thy hands : if thou learn well but one of these only thou canst live.

7. Not every mountain hath precious stones ; not every elephant hath a charm ;¶ not every forest hath the sandal-wood ; not every place hath a wise man.**

8. Surely he that is searching after knowledge should go with much yearning to the place where he heareth the wise man is that is filled with knowledge.

9. By degrees wisdom is learnt : by degrees riches are gotten : by

* Or Pali Language or Magadhi Language. The Pāli language is literally "the language of the Scriptures." The following is from Childers' account of the Pāli language—"The true or geographical name of the Pāli language is Māgadhi, 'Magadhese language', or Magadhabhāsā, language of the Magadha people." The word pāli in Sanskrit means "line, row, series" and by the South Buddhists is extended to mean the series of books which form the text of the Buddhist Scriptures. Thence it comes to mean the text of the Scriptures as opposed to the commentaries, and at last any text or even portion of a text of either Scriptures or commentaries. Pālibhāsā therefore means "the language of the texts," which is of course equivalent to saying "Māgadhi language." Childers' Pāli Dict. Preface, footnote.

† Or solid thing, or pith, or core, or best part.

‡ Or the night of perfect rest, or nirvāna, or nēgbān.

§ Or life to follow.

|| Or hill of white ants.

¶ Or charm against danger.

** Or a wise man of great fame, or a wise man of the Council of the King.

degrees he climbeth that climbeth a mountain : by degrees desire is appeased : by degrees anger cometh : by degrees are these five things.

10. The knowledge of seeing and hearing : the knowledge of the statutes* : the knowledge of reckoning : the knowledge of carpentry : the knowledge of the Books of Proverbs : the knowledge of healing by charms : the knowledge of music : the knowledge of throwing : the knowledge of shooting with the bow : the knowledge of the ancient writings :† the knowledge of medicine : the knowledge of jesting : the knowledge of the stars :‡ the knowledge of juggling : the knowledge of the Book of Words :§ the knowledge of the arts of messengers : the knowledge of the ways of speech :|| the knowledge of charms : these are the eighteen kinds of knowledge.

11. In the world if none asketh aught of the wise man he is like a drum that is not beaten ; if any asketh aught of him then his wisdom floweth forth as the rain : but the ignorant man whether any asketh aught or asketh not alway talketh much.

12. In the world the knowledge that is only in the books,¶ or the riches in the hand of another, when thou hast cause to use them, then the knowledge that is only in the books thou canst not call knowledge nor the riches in the hand of another riches.

13. In the world by the stalk of the water-lily thou shouldest know the water whether it be deep or shallow : by his deeds and the manner of his speech thou shouldest know a man whether he be base-born or of high birth : by his words thou shouldest know a man whether he be wise or a fool : by the green herb and the parched thou shouldest know the land whether it be rich or poor.

14. In the world he that hath a little knowledge thinketh that little knowledge much and is proud : wherefore is it thus ? A young frog that hath not seen the sea thinketh the well wherein he dwelleth to be a great water.

15. In the world if a man gather not knowledge in his first age : if he gather not riches in his second age : if he keep not the law in his third age : how shall he begin these things in his fourth age ?

16. My beloved children, learn knowledge and wisdom : wherefore are ye idle ? My beloved children, learn knowledge and wisdom every day. He that hath not knowledge and wisdom becometh the servant of another and rightly unto him that hath knowledge and wisdom is homage paid in the world.

17. In the world the mother is an enemy to her children, likewise the father is an enemy to his children ; wherefore is it so ? In the time of their

* Dammathāt.

† Or Purānas.

‡ Or Vedas.

§ Or Sānchān.

|| Or Thādda.

¶ Or on the palm-leaves.

youth they make them not to learn knowledge : therefore their place is not in the midst of the assembly, as the place of the bittern* is not in the midst of the wild-duck. Because they make them not to learn knowledge are they called their enemies.

18. Doth any sharpen the thorn that groweth in the valley? my son,† it becometh sharp of itself. My son,† hath any given his keen eyes to the deer? my son,† they are keen of themselves. Doth any give the sweet smell to the lily that is in the mud? My son,† the smell is sweet of itself. Doth any teach his good manners to the child of high birth? My son,† he must teach them to himself.

19. The betel-nut that is without lime hath an ill-savour: he that hath not riches hath an ill-savour when he putteth him on ornaments: that which is eaten without salt hath an ill-savour: he that hath not knowledge hath an ill-savour when he writeth a book.‡

20. He that listeneth and marketh carefully with his might becometh filled full of knowledge. By learning knowledge increaseth: from the knowledge that is learnt cometh understanding.§ He that hath understanding of that he should know hath happiness ever with him.||

21. In the world both unto the ox and to the man is the appetite and lust and sleep, but learning is unto the man alone; wherefore if thou fall short of learning thou becomest as the ox.

22. In the world there is no friend like knowledge: there is no enemy like disease: there is no lover like unto thyself: there is no strength like unto fate.

23. In the world the place of the duck is not in the midst of the crows: neither is the place of the lion in the midst of the oxen; neither the place of the horse in the midst of the asses: nor the place of the wise man in the midst of fools.

24. Surely though the ignorant man sit at the feet of the wise all his days he knoweth not the law: wherefore is it so? It is even as the ladle knoweth not the taste of the pottage.

25. Surely he that is wise if he sit at the feet of the wise even for a moment, quickly will he know the law: wherefore is it so? It is even as the tongue knoweth the taste of the pottage.

26. The strong man goeth not to the battle if he be not armed; likewise the wise man speaketh not but according to the scriptures; even as the merchant that goeth on a journey afar goeth not without companions; nor journeyeth any anywhither by himself.¶

27. In the world, if he lose his wealth, if there be sorrow in his mind,

* Or paddy-bird.

† Or Sir, or my masters.

‡ Or sacred verse.

§ Or the meanings are known.

|| Or beareth happiness.

¶ Or without companions.

if there be evil in his house, if any deceive him, if any mock him ; the wise man telleth not of these things.

28. In the world he that knoweth what he should say whatsoever happeneth ; that knoweth whom he should love ; that knoweth how to be angry : the same is called a wise man.

29. He that would eat of good things without money ; he that would fight without strength ; he that would dispute without knowledge : these are like unto madmen.

30. Going often times unto the house of another, not being called ; disputing often times with another, not being questioned ; being proud of his own conceit : these three things are a sign of the mean man.

31. He that is not comely babbleth much : so he that hath a little wisdom showeth it publicly : so the pot that is not filled with water troubleth the water :* so the cow that giveth not milk kicketh.

32. The young frog when he sitteth him down† thinketh, Now am I a lion, but when the crow snatcheth him up he coaxeth him saying, Friend, friend : likewise the fool that hath no wisdom thinketh himself wise, but when the wise man asketh him a question, then he speaketh unto him kindly saying, My lord, my lord.

33. Because the young frog sitteth in the like manner, shalt thou say, It is a lion ? because the pig grunteth in the like manner shalt thou say, It is a leopard ? because the cat hath the like colour and form shalt thou say, It is a tiger ? because their form appeareth the same in thine eyes shalt thou say, All wise men are equal in knowledge ?

34. No ruler is satisfied with his wealth ; so also is no wise man satisfied with the good word : as the eye is not surfeited by looking on the beloved, nor the sea surfeited with water.

35. It is not right that he fail in wisdom and learning that hath come to a full age, if he be of them that are noble. It is even as the acacia flower‡ that hath no smell.

36. In the world though a man be base-born he becometh a minister of the king ; though a man be a fool's son he becometh wise ; though a man be the son of him that hath no riches his wealth becometh abundant : therefore be ye not scoffers of men.

37. Whoso learneth much by his yearning after knowledge cannot interpret that which he hath learnt, as the dumb cannot tell that which he hath seen in his dreams.

38. The potter striketh not the pot to break it, but that it may be-

* Or troubleth the water by shaking.

† Or sitteth on his haunches as a lion.

‡ Or agati flower or the beautiful acacia flower.



come goodly ; so the teacher beateth not the scholar to make him miserable, but that he may increase in knowledge and wisdom he beateth him.

39. If any bind the flower of the periwinkle tree in the leaf of the butea tree, then to him it is not the flower of the periwinkle tree only that hath a sweet smell, for the leaf of the butea tree likewise smelleth sweetly : therefore it behoveth to follow both the wise man and them that cleave to him. Here endeth the book concerning them that are wise.

CHAPTER II.

1. Be ye companions with the righteous and keep ye company with the upright : the upright man knowing the law of the just becometh excellent and is not wicked.

2. Forsake the company of the wicked, but cleave unto the righteous for he is worthy of companionship. Work righteousness day and night, remembering alway that all things change continually.*

3. The fruit of the water fig tree when it is ripe without is red, but within it is altogether full of flies : as it is with these so is it with the heart of the wicked.

4. The fruit of the jaca† tree when it is ripe without seemeth covered with thorns, but within it is full of sweetness : as it is with these even so is it with the heart of the righteous.

5. In the world the sandal-wood though it be dead‡ loseth not the sweet smell ; neither loseth the elephant his comeliness in the eyes of men on the place of battle ; nor the sugar-cane his sweetness in the mill : even so he that is wise and good forsaketh not the law though he become poor and wretched.

6. That which is called a lion though he be an-hungred eateth not of any green thing ; that which is called a lion though he become lean eateth not of the flesh of the elephant : for being noble he keepeth the law of the noble.§ So he that is born noble though he become poor doeth not that which is not noble.

7. In the world the sandal-wood|| is sweet, and sweeter than the sandal-wood is the moon ; but sweeter than sandal-wood and moon is the righteous word of a righteous man.

8. Let not the words of the righteous transgress even for a moment, saying, Behold ! the sun that hath rays innumerable riseth in the West : Myinmo¶ boweth his head : or the fires of hell are cold, or the lily flowereth on the mountain-top.

* Or that the state of life changeth continually.

† Or jack-fruit tree.

‡ Or dried up.

§ Or guardeth his nobility.

|| Or almug tree.

¶ Or Mount Myin-mo or Mount Meru.

9. The cool shade of a tree is sweet ; and sweeter than the shadow of the tree is the shadow of thy family, thy father and thy mother ; and sweeter than this is the shadow of the learned ; and sweeter yet than this, is the shadow of the king : but very much more sweet is the sweetness of the law, that is called the shadow of the good God.

10. As the humble-bee desireth the flower, so loveth the righteous to be of good report : as the fly hankereth after all manner of rottenness, so longeth the wicked man after sin.

11. He that hath a wicked mother speaketh wickedness, and the son of a wicked father worketh wickedness : but if his father and his mother be both of them wicked, then both that which he saith and that which he doth becometh evil.

12. He that hath an excellent mother speaketh righteously, and the son of a good father worketh righteousness : if his father and his mother be both of them good then all that he saith and all that he doth becometh excellent.

13. There is need of the brave man in the place of battle : there is need of the skilful word in the time of wrath : the friend is wanted in the time of eating : or if there be any trouble before thee, then there is need of the wise man.

14. When one dog seeth another he showeth his teeth that he may oppress him : in the like manner when the wicked man seeth one that is righteous he vexeth him that he may cause him hurt.

15. In the beginning the foolish man of himself doeth not that which he hath to do, neither maketh he another man to do it : then doeth it carelessly in haste and sorroweth afterward.

16. In the world he that turneth away wrath is not troubled even for a little, and God, beside other good men, praiseth him that is grateful. It behoveth every one to be patient of the angry word, and him that is thus patient God, beside other good men, praiseth, saying, Behold ! this man is good.

17. In the world he is miserable that must live in a narrow place full of uncleanness ; and more miserable than he is he that must live among his enemies that love him not ; but yet more than he is he miserable that must live amid the ungrateful.

18. Teach them continually that thou shouldest teach, and keep them away from evil-doing. Is not this the good word ? Let him that is instructed love the upright man that instructeth him, but let him not love the unjust man that is wicked.

19. Honour him that is greater than thou and thou shalt be rewarded : keep thou the brave separate one from the other and thou shalt conquer : make thou a little present to him that is lesser than thou and thou

shalt win him : be thou diligent and thou shalt overcome him that is thine equal.

20. In the world not every one telleth of the poison, saying, This is poison ; but of the goods of the priest they tell, saying, Truly this is poison : for the poison slayeth but once, but as for the goods of the priest they kill for ever.

21. By his swiftness is known the goodness of the horse : by the weight of his burden the goodness of the ox : by the much milk she giveth the goodness of the cow : and the wisdom of the wise man by the wisdom of his speech.

22. The riches of the just though they be little are like unto the water that is in the well, for they are a place of refuge unto all : but the riches of the unjust though they be great are like unto the waters of the sea, for in them is no place of refuge neither for them that bathe nor for them that drink.

23. The rivers drink not of their own water, neither eat the trees of their own fruit, nor fall the rains in every place : likewise are the riches of the just man only for an help unto others.

24. Desire ye not that which ye should not desire, neither think ye that which ye should not think ; but meditate ye carefully on the things that are,* loving not to make your time profitless.

25. Without endeavour it cometh and with endeavour it cometh not. Is not this word true ? For the possession of riches cometh neither unto man nor unto woman according to their endeavour.

26. Whosoever loveth the wicked : whosoever loveth not the righteous : whosoever loveth only the law of the unjust : by these things shall he be destroyed. Thus shall it be with him. Here endeth the book concerning them that are good.

CHAPTER III.

1. Love not the wicked man greatly : it is as the pot thou bearest on thy head that is not full of water and maketh a noise.

2. The snake hath an evil temper and likewise hath the wicked man an evil temper, but the temper of the wicked man is more evil than the temper of the snake ; for the temper of the snake is quieted by the charm, but how shall ye cure the temper of the wicked man ?

3. When the foolish man knoweth his own foolishness, then, though he be foolish, shall he be called wise ; but when the foolish man thinketh himself to be wise though he be still foolish, then shall they say of him, Verily this is a fool.

* Or of nature.

4. Whatsoever evil the foolish man doeth, it profiteth him not ; and though he thinketh it to be even as honey, whensoever his evil deed prospereth then doth misery fall upon him.

5. The foolish man when he hath strength in his body becometh wicked and striveth after the goods of another by force : the foolish man that hath little wisdom when his body is destroyed goeth down into hell.

6. In the house it is the rat that maketh mischief : in the forest it is the monkey : among the birds it is the crow, and among men it is the teacher of false doctrines.*

7. The night seemeth long to the wakeful man : the way seemeth long unto him that journeyeth : likewise his life seemeth long to the foolish man that knoweth not the righteous law.

8. The man that hath an evil mind seeth the fault of another though it be only as a sesamum seed : but though his own fault be as a cocoanut, he seeth it not.

9. If thou wouldest be wise show not thy fault unto another, but strive to learn his fault. Wherefore should this be so ? Hide thy faults as the turtle draweth in his head and his members, but mark well the faults of others.

10. When the foolish man praiseth the wise, it is called chiding, but if the wise man praiseth the wise, then is it called praise indeed.

11. Make a present and thou shalt win the covetous : bow down before him and thou shalt win the haughty : follow after him† and thou shalt win the foolish : speak the truth and thou shalt win the wise. Here endeth the book concerning them that are wicked and foolish.

CHAPTER IV.

1. If a stranger work for thine advantage then is he as thy brother, and if thy brother work not for thine advantage then is he as a stranger : so the sickness that is part of thee‡ is not for thy profit, but the medicine that cometh from the desert§ profiteth thee greatly.

2. He that speaketh slightly behind thy back, but speaketh kindly to thy face ; shun thou him as a friend that hath such an heart, as the bee avoideth the poison that is in the pot.

3. If thy riches decrease thy friends cast thee off ; likewise desert thee thy wife, thy children, and thy brethren ; only will they shelter them under thy riches : wherefore in the world thy greatest friend is thy wealth.

4. In the world thou canst only know thy servant if he be good or bad when thou usest him : so only canst thou know thy brethren in the

* Or Pōṅnā or the Brahmin.

† Or obey his will.

‡ Or within thy body.

§ Or forest.



time of danger : so canst thou know thy friends when thy riches are few : so canst thou know thy wife when thy wealth is fled.

5. Whosoever increaseth thy prosperity call him thy friend : whosoever giveth thee food call him thy father and thy brother : whosoever loveth thee him also call thy friend : and whosoever being happy maketh thee happy call thy wife.

6. Make not a great friend of thine enemy, neither make close acquaintance with thy friend, for when they are angry they will discover thy faults.

7. Whosoever hath once quarrelled with his friend if he wish to be one with him again, he must pursue him unto death,* as the mare doth that is with young.

8. So long as thy desire be not fulfilled bear thine enemy on thy shoulder : but when the time of the fulfilment of thy desire cometh, then destroy thou him as thou wouldest break the pot thou carriest against the rock.

9. That which remains of thy debt : that which remains of the fire : those also that remain of thine enemies often times increase again : therefore leave thou none remaining.

10. Whosoever hath a face as fair as the water-lily : whose speech is sweet as the sandal-wood, and whose mind is as the poison that slayeth quickly : put not thy trust in such an one.

11. Trust not the master that is rough : still less put thy trust in the master that is quick to anger : still less in him that praiseth not : still less in him that is an oppressor.

12. Keep the thing that is horned fifty cubits from thee : keep the horse one hundred cubits from thee : keep the elephant that hath tusks one thousand cubits from thee : keep the bad man from thee altogether.

13. An evil abode ; a wicked husband ; a wicked people ; a wicked friend ; a wicked wife ; a bad servant : these must be kept afar off.

14. Whatsoever friend cometh forward when thou art oppressed with sickness ; when thou art an-hungered ; when thou lovest thy wealth ; when thou art in the hands of thine enemy ; when thou art before the king ; when thou art in the place of sepulture : only such a friend canst thou call a friend indeed.

15. Whosoever speaketh fair words hath many friends, but the harsh man hath but few. Seest thou not here the parable of the sun and the moon ? Here endeth the book concerning friendship.

* Or the kingdom of death.



CHAPTER V.

1. The beauty of the black cuckoo is his voice : the beauty of a woman is her love for her husband : the beauty of the uncomely is their knowledge, and the beauty of the priest is his long-suffering.

2. The wealth of a woman lieth in her beauty : of a man in his knowledge : of a priest in his well-doing : of a king in the strength of his armies.

3. A priest is comely if he be lean, as a four-footed beast is comely when he is fat : so a man becometh comely when he is wise and a woman when she hath an husband.

4. Be the harper never so good, if he play not on the harp for five days only his skill is fled ; be the archer never so skilful if he shoot not with the bow for seven days his cunning deserteth him : so the honour of a wife if she be a month separate from her husband is destroyed, and the disciple is lost if he be but half a month from his master.

5. The buffalo rejoiceth when he is in the mud, and the red duck when he is in the lake : so the woman rejoiceth when she hath an husband, and the priest when he doth according to the law.

6. Thou mayest praise the corn* after thou hast eaten of it, so thou mayest praise thy wife when she is become old : so likewise thou mayest praise the army when it returneth home after the enemy is conquered, and thy grain after thou hast stored it in thy barns.

7. The woman that hath been put away from two or three husbands ; the scholar that hath learned in two or three schools ; and the bird that hath escaped twice or thrice from the net knoweth well the way thereof.

8. Tame the wicked by beating : tame the bad husband by firm words : tame the bad wife by keeping away the money from her, and the greedy man by making him an-hungered.

9. The night that hath no moon is not good to look upon ; nor the sea that hath no waves ; nor the lake that is without wild-ducks ; nor the damsel that is without an husband.

10. It is the husband that should bring the riches, and it is the wife that should keep them. Is not this saying true ? For it is the man that should be the leader of the woman† as the needle is of the thread.

11. Every river is crooked : every forest is full of fire-wood : every woman when she is in a quiet place doeth evil.

12. The woman that is a disputer ; that is envious and a backbiter ; that is covetous of whatsoever she seeth ; that cooketh much and eateth of it ; that eateth before her husband ; that goeth abroad to other's houses :

* Or the rice.

† Or be the beginner or the original cause.

her husband should put her away though she hath borne him an hundred children.

13. The woman that delighteth in her husband when he eateth and when he adorneth himself, and as a mother correcteth that which is wrong ; that is much ashamed as a sister when she seeth that which is not decent or that which should be hidden ; that is respectful as a slave before her husband when he hath business ; that obtaineth a companion to consult in the time of trouble ; that giveth joy in the hour of sleep ; that is clever to make herself comely ; that is patient in the time of anger : that woman he that is wise calleth excellent, and when she is dead she is counted among the angels.*

14. The maiden whose flesh is as the colour of gold ; that hath eyes black as the hart's ; whose waist is small and whose loins are broad ; whose leg tapereth as an elephant's trunk ; whose hair untied curleth at the tips ; whose teeth are level ; that hath a deep navel ; that is pleasing in her carriage† : thou shouldest wed such an one even if she be of low birth.

15. The eighth month‡ is the most excellent among the seasons ; so the most beautiful is the best among women ; even so the eldest is the most excellent among sons and the North among the four quarters.

16. The woman that in each life§ desireth steadfastly to become a man must bear herself towards her husband respectfully, even as the wife of the chief of the Spirits|| beareth herself respectfully to him.

17. Whatsoever man in each life¶ desireth steadfastly to become a man goeth not near the wife of another, as he that would wash his feet shunneth the mud.

18. If he that hath become old take to wife a young girl, whose breasts are small as the fruit of the fig-tree, not being able to deal with her according to her desire, then she doeth him an injury.** Believe her not if she saith she knoweth her old husband only : wherefore being wedded to a young wife he shall come to ruin by reason of her. Here endeth the book concerning women.

* Or goeth to the country of the spirits or of the Nàts.

† Or habits.

‡ Or November.

§ Or in each state of life.

|| Or Nàts.

¶ Or in each state of life.

** Or speaketh evil of him behind his back.

CHAPTER VI.

1. A king sleepeth but one watch of the night : a wise man sleepeth but two : but he that is wedded sleepeth for three and the beggar sleepeth all night.*

2. In whatsoever place there is none that is rich ; no wise man that seeth and heareth much ; no king ; no river ; and likewise none to heal : in the place where are not these five remain not even for a day.

3. In whatsoever place there is none to love, none to desire, none that is friendly, none to teach wisdom and learning : remain not in that place even for a day.

4. In the world the house is desolate wherein are no children and the kingdom desolate that hath no king : so the mouth of him that hath no wisdom is dumb† and all is desolation to him that is poor.

5. In the world he that would be rich becometh a trader : he that would be learned serveth him that is wise : he that would have sons marryeth a young wife : and he that would be a ruler doeth the desire of the king.

6. The priest that is not content cometh to ruin, as a lord of the world, if he be satisfied, cometh to destruction : so an harlot is ruined if she become modest, or she that is pure if she lose her modesty.

7. The strength of a bird is as the heavens : the strength of a fish is as the sea : even as the strength of a king is as a weak man and the strength of a child is a cry.

8. Long-suffering, wakefulness, industry, almsgiving, mercy, prudence : these six things are the glory of kings, of rulers, and of parents. This is the glory they desire that are good.

9. In the world kings command but once ; priests and teachers‡ speak but once ; prophets§ teach but once : and after their manner doeth|| the good man that is worthy to be loved.

10. In the world the idle man is evil if he be married, so is the priest evil if he keep no guard over his body or his mouth or his heart : likewise is the king evil that doeth aught without thinking of it, and the wise man that is wrathful if his wrath escape him.

11. In whatsoever place there are many great men¶ each desiring to be called a wise man and longing to be the chief of all : the work of those men cometh to nought.

* Or for four watches.

† Or quiet or desolate.

‡ Or Brahmans or Pongnas.

§ Or saints or gods and the holy.

|| Or followeth their teaching or doeth the law of their meaning.

¶ Or chiefs.

12. Every king should of himself know his revenues whether they be less or more, and his provisions if they be enough or not: of himself he should know his servants if they do not their business; that he that is worthy of disgrace may be disgraced, and he that is worthy of greatness may be made greater.

13. In the world turn thy back toward the sun and thy belly to the fire, pay respect with thy whole body to the great man,* and by wisdom find a way to the world to come.†

14. In the world touch neither fire, nor water, nor a woman, nor a fool, nor a snake, nor a prince, but pass them by or instantly they will take away thy life.

15. In the world if any hath a bad wife, hath rude servants and evil-minded, hath a snake in his house: verily he shall die.

16. In the world by teaching wisdom to him that is very foolish, by living with a very wicked wife, by keeping company with the unjust shalt thou become less even though thou art a wise man.

17. In the world if the son do an evil deed thou sayest, His mother doeth it: likewise if the disciple work evil thou sayest, The master doeth it: so if the people do wrong thou shalt say, It is the king that hath done this; and if the king himself do evil then shalt thou say, This is the work of the High Priest.‡

18. By his kindness§ a king should conquer him that is wrathful and proud, and him that is dishonest by his honesty: even as he overcometh the sour man by a present and by his truthfulness the liar.

19. In the world the rude man is tamed by a gift and by a gift cometh every good thing; for he that bringeth gifts and fair words gaineth respect from another because he payeth it.

20. Gifts and offerings bring|| love in the world, as a sour mind bringeth¶ hate: so also gifts and offerings bring|| many followers even as a sour mind bringeth¶ loneliness.

21. In the world thou canst conquer the enemy thou desirest to conquer, if he use not his advantage when it is great, for then thou becomest his equal: it is as thou makest a rope of grass and with it bindest an elephant.

22. A king that hath his fill of armies, if he be not able to conquer

* Or lord or master.

† Or offer respectfully thy back to the sun, thy belly to the fire, thy whole body to the great man, and thy wisdom to the world to come.

‡ Or the Parohit or Chief Brahman.

§ Or without anger.

|| Or are the medicine or charm for.

¶ Or is the medicine or charm for.



his enemies, what profiteth him his power ? It is as a fire, that is kindled in a place where is no wind, that burneth not.

23. None gratifieth his lust as a king, so none taketh either his form, or his speech, or his ornaments,* or his clothing or his jewels or anything that is his.

24. The king is not my kinsman†; the king is not my wife's brother‡; the king is my master§ : keep these alway in thy mind.

25. When thou waitest on the king stand not afar off; neither approach very close; nor go between him and the wind; nor keep in front of him; nor look from a place lower than he, nor yet from one that is higher: these six things thou shalt not do: keep thyself from these as thou guardest thyself from fire.

26. Be thy glory as the glory of the God that knoweth all things, if thou obtain not the favour of the king,|| it becometh thee not: for it behoveth the ruby that is of great price to be set in gold.¶ Here endeth the book concerning kings.

CHAPTER VII.

1. How shall the priest do his duty that keepeth close acquaintance with a woman? or how shall he have a tender heart that eateth much of flesh? How shall he speak true words that drinketh strong drink? or he know shame that hath strong desire? How shall he obtain knowledge that is very idle? or he gather riches that grovelleth?

2. He that is a drunkard; that goeth abroad at wrong times; that goeth often times unto feasts; that is a gambler; that hath evil friends; that is an idler: he that doth these things cometh to destruction by reason of them.

3. In the day time speak not without looking first, and in the night time without asking first, but bear thyself as the hunter that is fearful of danger and looketh to and fro in the forest.

4. The prophet** Byasa saith of five kinds of men that they are dead while yet alive: these are they that are poor, that are sick, that are ignorant, that are debtors, that are about the king.

* Or his flowers and sweet smelling things.

† Or spouse.

‡ Or sister's husband.

§ Or lord.

|| Or the refuge that is called the king.

¶ Or the ruby of great price if it be set in gold becometh goodly.

** Or teacher.

5. It is the wisdom* of the wise man that he seeth danger ere yet it cometh and avoideth it from afar, neither is he afraid when he seeth that it hath already fallen on him.

6. In the world he that sleepeth over much, that is forgetful, that taketh his ease, that hath much sickness, that is lazy, that is strong in his lusts,† that is eager for whatsoever is new: these seven know not the Scriptures.‡

7. Go to the poor, thou gift: for he that hath many gifts is surfeited. Go unto the valley, thou Angel of the Rain; for the sea is surfeited with water. Such is not the law, but the deed is thine own.§

8. In the world when any hath finished that he hath to do he regardeth it no more||: therefore when thou hast aught to do, leave undone a remainder thereof.

9. In the world cotton is light, but lighter¶ is he that is wanton, and lighter still is he that hearkeneth not unto his parents and his teachers, and lighter yet than all is he that heedeth not the word of the excellent God.

10. In the world the sunshade** that is of stone is of worth,†† and of greater worth‡‡ is it to hearken to the Angels, and greater still is the worth§§ of the instructions of thy teachers and parents, but the word of the excellent God is the most worthy§§§ of all.

11. In the world thy right hand is called the slave of the body and his little finger the slave of the ear and the nose and the eyes, but the left hand is called the slave of the feet.

12. The angel||| Kuwera dwelleth in the midst of the betel-leaf: at the bottom thereof there dwelleth a spirit¶¶ and at the top thereof there dwelleth a devil.*** Wherefore when thou eatest of it, cut off the top and the bottom thereof, and thou shalt be of good repute.

13. An angel of high degree††† guardeth the tablets; an angel of

* Or nature.

† Or hath great desires.

‡ Or the books.

§ Or this is not the law of nature, but the deed is the original cause.

|| Or careth no more for it.

¶ Or more worthless.

** Or *htie* or umbrella.

†† Or heavy.

‡‡ Or heavier.

§§ Or heaviest.

||| Or *nàt* or spirit.

¶¶ Or *belu* or sprite or *yakkha*.

*** Or he that is evil.

††† Or a *Brahma*.

lesser degree* guardeth the bindings† thereof; therefore it behoveth him that learneth knowledge to propitiate the angels both of the higher and lower degree,‡ for they love him that doth this.

14. According as the ox cherisheth man and bringeth him wealth, so let him love him as a parent and respect him.

15. Whosoever eateth of the flesh of the ox the same is called the devourer of his own mother's flesh: if an ox die it is meet that he be given to the birds of the air§ or unto the waters.||

16. He that learneth on the fifth day of the week will be complete in knowledge: he that learneth on the first or sixth day will leave undone a part thereof: he that learneth on the second or fourth day will obtain none of it¶: and he that learneth on the third or last day of the week will die.

17. There is that sayeth that he that learneth knowledge on the eighth day of the waxing or the waning moon killeth the teacher, and that he that teacheth knowledge on the fourteenth day of the waxing or the waning moon killeth the scholar: also there is that sayeth that if knowledge be taught on the tenth day of the waxing or the waning moon it will be destroyed, and that if it be taught to any at the full moon his parents will be slain.

18. In the world he that learneth knowledge eateth not of the cocoanut on the seventh day of the waxing and the waning moon: on the ninth day also he eateth not of the gourd, neither of the kenbeng on the twelfth day, nor on the third day of the divers kinds of curries: if he eat of these his knowledge will be lost.

19. In the world a man is renounced for the profit of his family: a family for the profit of the village: a village for the profit of the city: and the whole world for the profit of a man.**

20. In the world the lion, the good man and the elephant, these leave the place that is not for their advantage and go their way; but the crow, the bad man, and the deer, these come to destruction in the place where they find delight.

21. In whatsoever place there is none to love and none to desire, there is no friend and none to teach: tarry thou not there.

22. The wise man goeth to the new place with a watchful mind as one that goeth forward, and remaineth in the old place with a constant

* Or a Pisana.

† Or bag.

‡ Or both the Brahmas and the Pisanas.

§ Or the Vultures.

|| Or that he float on the water.

¶ Or be of a calm mind.

** Or self.



mind as one that standeth still: wherefore leave not quickly the old place without trying the new.

23. A woman when she eateth eateth twice as much as a man, but her wisdom is four times greater than his, and her lust eight times greater.

24. In the world the taste of the sugarcane becometh sweeter according as the joint is further from the top; so the excellent man that is a good husband becometh sweeter from the beginning even unto the end, as doth the sugarcane: likewise also the evil friend by degrees loseth his sweetness, as doth the sugarcane when thou eatest thereof from the bottom to the top.

25. If the country be filled full of husbandmen and of merchants and of noblemen and of priests of good repute, then shall the borders be increased.

26. The wisdom of him that prayeth not fadeth away, as the house of him that is idle becometh foul: even so also is idleness as rust to him that is beautiful, and sloth as dirt to the sober priest.

27. In the world the riches of them that do little labour become the riches of them that work much. They that are come to a low estate teach, saying, Our fortune is the reason thereof: but they that are wise teach not so, saying, It is because they do not their work with all their might. If the work be not finished, and he profiteth not according to his desire; Is the fault with it? Nay, the fault lieth not with it.

28. Whosoever is of low estate, neither can work with his lips nor with his hands, whose form is not fair, who lacketh strength: though he be blamed by reason of these, yet is this age a lesser age and maketh his wealth only to be of any worth. Here endeth the book concerning divers matters.

29. The book concerning the wise; the book concerning the good; the book concerning the evil; the book concerning friends; the book concerning women; the book concerning kings; the book concerning divers matters. He who put in order these seven books is called Chakkindabi the true teacher of the law,* the great High Priest, Master of the Law,† that dwelleth in the building that is built of brick‡ in the Sacred Ground.§ He made clear the interpretation of the writings of the Book of the Proverbs of Common Life in the second fifth-month|| on the first day of the week¶ and the seventh of the waning moon, in the eleven hundred and ninety-sixth year.

* Or Saddhamma Dhaja.

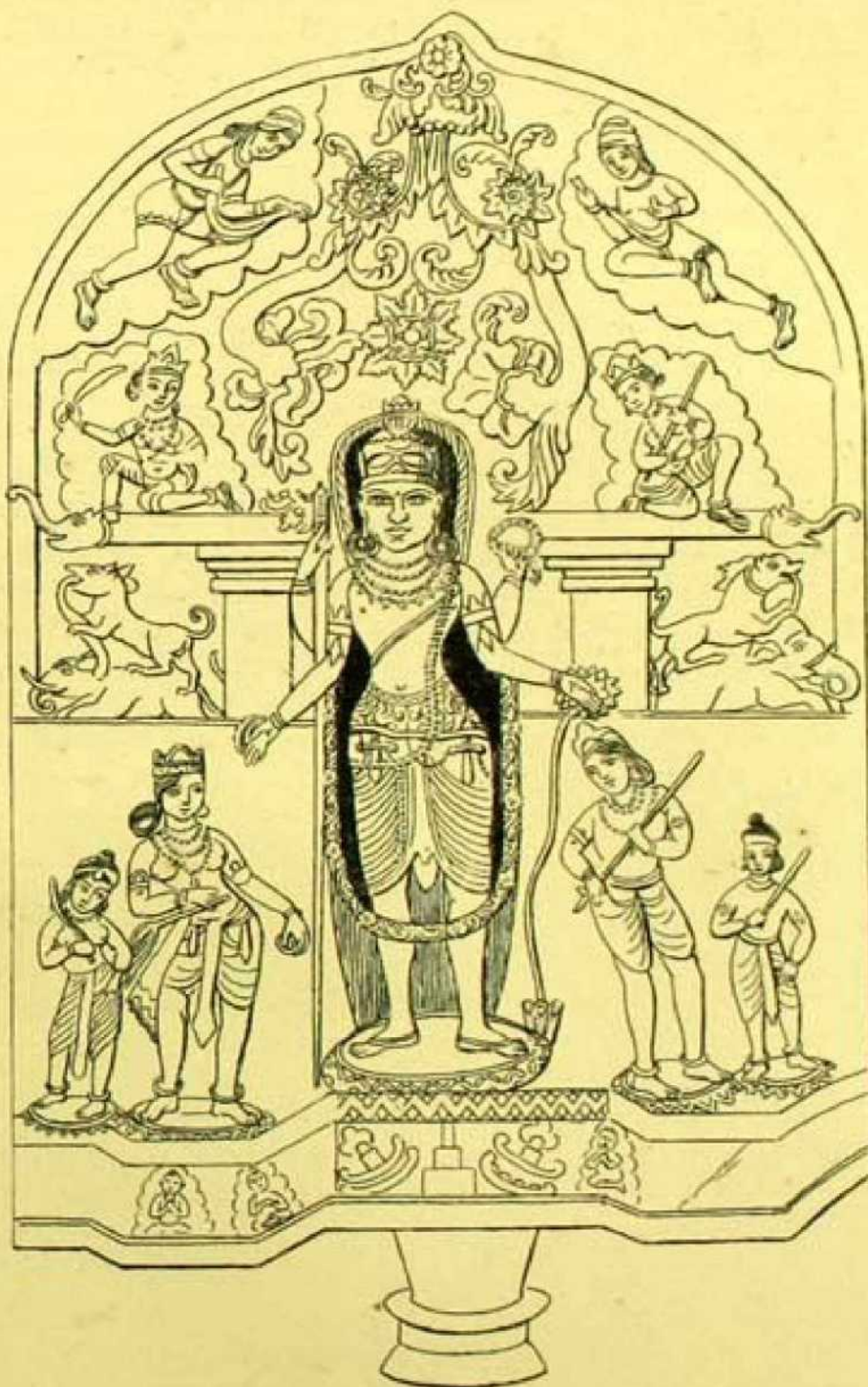
† Or Mahā Dhammarāja Guru.

‡ Or in the Ok Kyoung.

§ Or Mahā Oung myē bōngtsān.

|| Or intercalary month.

¶ Or Sunday.



SUPPOSED TO REPRESENT VASU DEVA
SON OF MANICK CHANDRA. Fig. 2

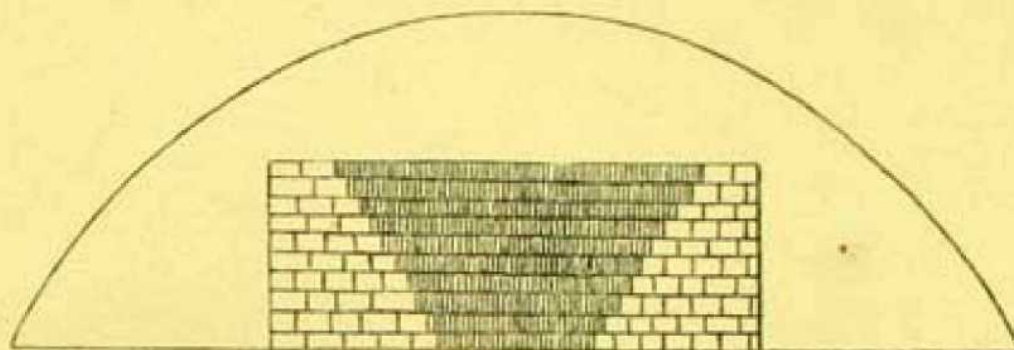


Fig. 3.
Haris Chandra Raja's Tomb.

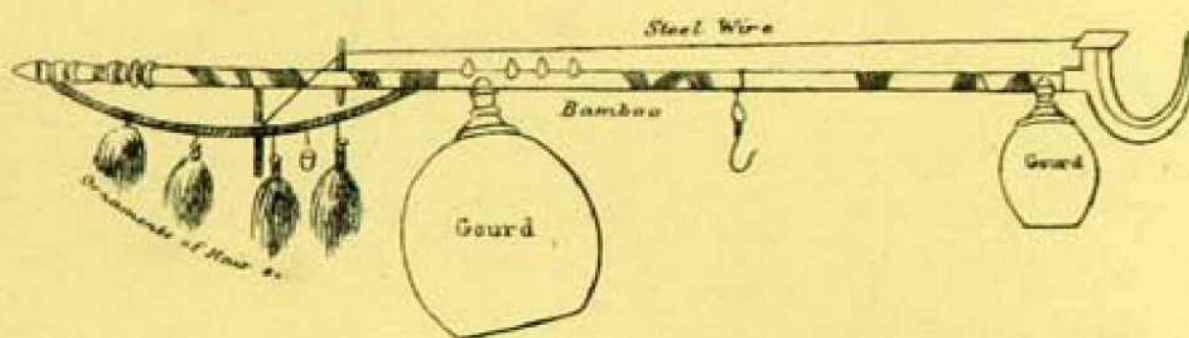


Fig. 4.
Sarunga or Tambura.

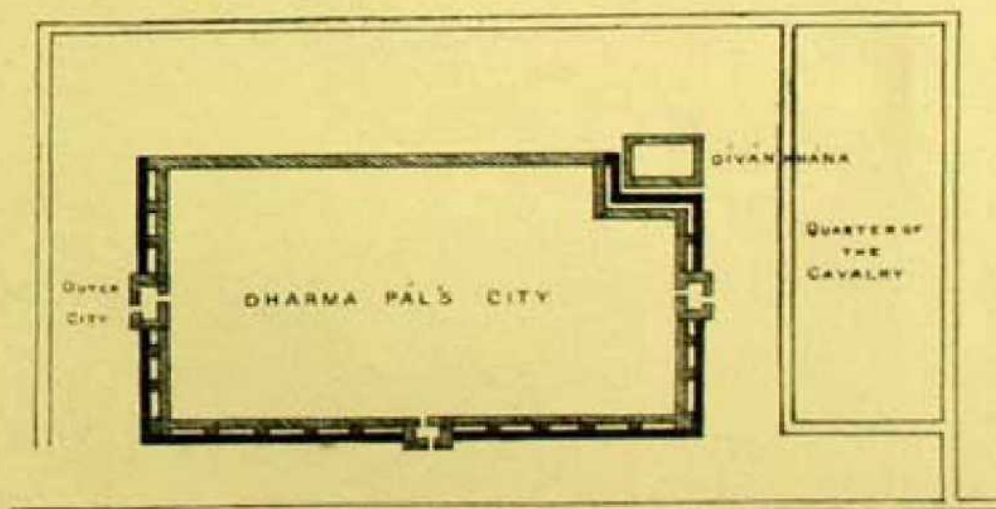


Fig. 1

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Part II.—PHYSICAL SCIENCE.

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#### No. I.—1878.

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I.—*Description of* *Ruticilla schisticeps*, *Hodgs.*—*By* W. T. BLANFORD,
F. R. S.

(Received October 11th, 1876 ;—Read March 7th, 1877.)

(With Plate I.)

Since the original description of the male of this bird was published in the appendix to the first 'Catalogue of the specimens and drawings of Mammalia and Birds of Nepal and Thibet' presented by Mr. Hodgson to the British Museum, I am not aware that anything has been added to its history. It does not appear to have been seen by Blyth or Jerdon, there is no specimen in the Society's old collection, nor to the best of my belief has there hitherto been one in the Indian Museum, and the bird has not yet, so far as I know, been found in the western Himalayas or in Turkestan. Unless Colonel Prejevalski has obtained it in Mongolia, I do not think it has hitherto been procured elsewhere than in the Tibetan region north of Sikkim and Nepal. The female, so far as I can learn, has not been described, although there appears to be a figure of it amongst Mr. Hodgson's drawings.

I have just received a pair of this rare bird from Mr. Mandelli, and the following is a description of both sexes.

Male. Crown of head and nape, greyish blue, paler in front, becoming rather darker on the nape. A narrow band on the forehead, lores, sides of head and neck, chin and sides of throat, and back glossy black. Scapularies

black at the base, but with a broad tip of ferruginous or rich chestnut, lower rump and upper tail coverts the same. Quills black; a broad white band, formed by the whole of the median coverts, and the basal portions of the greater coverts, together with the outer edges of the last 3 or 4 secondaries (tertiaries of some writers), traverses the wing longitudinally. Tail black. Beneath, there is a white spot in the middle of the throat, in contact with the rich ferruginous tint of the breast, abdomen and lower tail coverts, which are the same colour as the rump; axillaries white, under wing coverts black and white mixed, inner margins of quills dusky grey. Wing, 3.5; tail, 2.95; tarsus, 0.93; culmen, 0.62; bill from front, 0.4.

Female. Olive brown above, forehead, lores and sides of head paler and more rufous; rump, upper tail coverts and basal portion of all the tail feathers, except the middle pair, ferruginous; central rectrices and terminal portion of all the others black, rather browner than in the male however; quills brownish black with paler brown edges, and a white bar over the wing as in the male. Chin, throat, breast, sides of abdomen and flanks rufescent brown with an olive tinge; a white spot, as in the male, in the centre of the throat; middle of the abdomen paler, lower tail coverts pale rufous. Wing 3.2, tail 2.8.

Of course I have no means of ascertaining certainly that the female is correctly identified, as the birds were obtained by Mr. Mandelli's collectors, but the white breast-spot leaves very little doubt on this head. As regards the locality, the only information Mr. Mandelli can give me is that these birds were obtained in Tibet in the month of November 1875.

II.—*Aberrant Dentition of Felis Tigris*.—By R. LYDEKKER, B. A.

(Read 6th February, 1878.)

(With Plate II.)

In the accompanying plate (No. II), there is represented the right ramus of a mandible of an individual of *Felis tigris* which was killed in British Burma; this jaw is remarkable in that it carries an additional premolar. The normal number of lower molar teeth in the genus *Felis* is three, namely, two premolars, which are respectively the penultimate and ultimate of that series, and one true molar, which is the first of the latter series, and which is often known as the "carnassial tooth."

In the figured specimen, there is between the canine tooth and the penultimate premolar, a small and simple tooth, which is the ante-penultimate



tooth of the premolar series, and which, as we have seen, does not occur in the normal dentition of the genus *Felis*; on the left side of the figured jaw this additional premolar is absent.

The interest that attaches to the presence of this additional premolar in our specimen, is that in an extinct genus of *Felidae*, the normal number of the lower premolars was three in place of two, as in *Felis*. This extinct genus was named by M. Gervais *Pseudaelurus*,* and the one species (*P. quadridentatus*) on which it was determined, was obtained from the miocene formation of Sansan in France; the species was previously named by De Blainville in his "Osteographie," *Felis quadridentatus* and *F. tetraodon*. Subsequently Professor Leidy† described a second species of the genus, under the name of *P. intrepidus*, from the Pliocene of Nebraska. Still later, I myself‡ described the lower jaw of a third species, *P. sivalensis*, from the Siwaliks of this country.

It is well known that the small number of the molar series which exists in the living *Felidae* is a highly specialized character, which is not found in the oldest carnivora, nor in many of those which are still living. The existence of an additional lower premolar in the Miocene and Pliocene genus *Pseudaelurus* shows that that genus is less specialized than *Felis*, and indicates that the former was probably the line through which the latter was described from some primitive carnivore in which the whole four of the typical premolar series were developed. The occasional occurrence of the ante-penultimate lower premolar in *Felis* must be regarded as an instance of "reversion" towards the genus *Pseudaelurus*.

* "Zoologie et Paléontologie Françaises", Vol. I, p. 127.

† "Extinct Mammalia of Dakota and Nebraska," p. 52.

‡ "Records of Geological Survey of India," Vol. X., p. 83.

III.—*Record of the Occurrence of Earthquakes in Assam*
C. S. I., V. C.,

Date.	District.	Time of Occurrence.
15th February.	Darrang, Mangaldai.	10.45 A. M.
Do.	Kámrúp, Gauháti.	11 A. M.
	No reports reached from Goálpára, Nowgong, Lakhimpur,	
23rd do.	Kámrúp, Barpetá.	11.50 P. M.
Do.	Goálpára, Goálpára.	12.8 P. M.
	No reports reached from Gauháti, Darrang, Nowgong, Sibságar,	
28th do.	Goálpára, Goálpára.	10 P. M.
Do.	Gáro Hills, Túrú.	11.40 P. M.
	No reports reached from Kámrúp, Darrang, Nowgong,	
	March	
15th March.	Khási Hills, Shillong.	3.33 P. M.
	No reports reached from Goálpára, Kámrúp, Darrang, Nowgong,	
20th do.	Khási Hills, Shillong.	5 A. M.
	No reports reached from Goálpára, Kámrúp, Darrang, Nowgong,	
	April	
29th April.	Khási Hills, Shillong.	10 P. M.
	No reports received from Goálpára, Kámrúp, Darrang, Nowgong,	
	May	
11th May.	Kámrúp, Gauháti.	9 P. M.
Do.	Khási Hills, Shillong.	9.10 P. M.
Do.	Darrang, Tezpur.	9.15 P. M.
Do.	Nowgong, Nowgong.	9.30 P. M.
	No reports received from Goálpára, Sibságar, Lakhimpur,	
17th May.	Khási Hills, Shillong.	10.10 P. M.
Do.	Darrang, Tezpur.	10.35 P. M.

during 1877. Communicated by COL. R. H. KEATINGE,
Chief Commissioner.

Duration.	Extent of damage if any, and general remarks.
20 to 25 seconds.	No damage, two distinct shocks and preceded by loud rumbling noise.
A second.	No damage.
Sibságar, Sylhet, Cachár, Nága Hills, Gáro and Khási Hills.	
4 seconds.	No damage.
7 seconds.	Do.
Lakhimpur, Sylhet, Cachár, Nága Hills, Gáro and Khási Hills.	
3 seconds.	No damage. Slight shock.
30 seconds.	Do. do.
Sibságar, Lakhimpur, Sylhet, Cachár, Nága and Khási Hills.	
1877.	
10 seconds.	No damage.
Sibságar, Lakhimpur, Sylhet, Cachár, Nága Hills, and Gáro Hills.	
5 seconds.	No damage.
Sibságar, Lakhimpur, Sylhet, Cachár, Nága and Gáro Hills.	
1877.	
3 seconds.	No damage.
Sibságar, Lakhimpur, Sylhet, Cachár, Nága Hills and Gáro Hills.	
1877.	
12 seconds.	No damage.
45 seconds.	No damage.
10 to 12 seconds.	Two distinct shocks. Severe and very marked. No damage. Declared by Deputy Commissioner to be the severest felt since the great one in September 1875. The shocks were not preceded by the usual rumbling noise and were not quick and jerky, but long and undulating.
5 seconds.	No damage. One sharp shock.
Sylhet, Cachár, Nága Hills and Gáro Hills.	
30 seconds.	No damage.
6 to 8 seconds.	No damage. Two clear distinct shocks at intervals of 3 to 4 seconds between the two shocks. Very marked, but not severe; not preceded by the usual rumbling noise.

Date.	District.	Time of Occurrence.
No reports received from Goálpára, Kámráp, Nowgong, Sibságar,		
June		
4th June.	| Nága Hills, Sámagúting.	| 3.30 P. M.
No reports received from Goálpára, Kámráp, Darrang, Nowgong,		
7th do.	| Khási Hills, Shillong.	| 12.24 P. M.
Do.	| Goálpára, Goálpára.	| 12.25 P. M.
Do.	| Kámráp, Barpetá.	| 12.25.5 S. P. M.
Do.	| Kámráp, Gauháti.	| 12.30 P. M.
Ascertained that the shock was not felt in Darrang, Nowgong,		
July		
9th July.	| Khási Hills, Shillong.	| 1.15 A. M.
Ascertained that the shock was		
10th July.	| Kámráp, Gauháti.	| 1 A. M.
Ascertained that the shock was		
August		
3rd August.	| Darrang, Tezpur.	| 12.30 P. M.
Do.	| Nowgong, Nowgong.	| 2 P. M.
No reports received from Goálpára, Kámráp, Sibságar,		
August		
6th August.	| Khási Hills, Shillong.	| 9.30 P. M.
Do.	| Nowgong, Nowgong.	| 9.30 P. M.
Do.	| Darrang, Tezpur.	| 10.30 P. M.
Ascertained that the shock was not felt in Goálpára, Kámráp,		
17th do.	| Khási Hills, Shillong.	| 1 A. M.
Do.	| Darrang, Tezpur.	| 1.30 A. M.
Ascertained that the shock was not felt in Goálpára, Kámráp,		
21st do.	| Goálpára, Dhúbri.	| 5.50 P. M.
Do.	| Gáro Hills, Túrú.	| 5.37 P. M.
No reports received from Kámráp, Darrang, Nowgong, Sibságar,		
22nd do.	| Khási Hills.	| 4 P. M.
No reports received		
25th do.	| Nowgong.	| 9 P. M.
Do.	| Khási Hills, Shillong.	| 9.30 P. M.
Do.	Darrang, Tezpur.	9.40 P. M.

Duration.	Extent of damage if any, and general remarks.
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Lakhimpur, Sylhet, Cachár, Nága Hills and Gáro Hills.

1877.

Very short. | Slight and unaccompanied by noise.

Sibságar, Lakhimpur, Sylhet, Cachár, Gáro Hills and Khási Hills.

5 seconds.	| No damage.
1½ minutes.	| Slight shock. No damage.
5 seconds.	| No damage.
5 seconds.	| Smart shock no damage.

Sibságar, Lakhimpur, Sylhet, Cachár, Nága and Gáro Hills.

1877.

3 seconds. | No damage.

not felt in any other district.

Very short. | Slight. No damage.

not felt in any other district.

1877.

6 to 8 seconds.	| Slight, no damage, preceded by usual rumbling noise.
2 seconds.	| Slight. No damage.

Lakhimpur, Sylhet, Cachár, Nága, Gáro and Khási Hills.

1877,—(continued).

5 seconds.	| No damage.
2 seconds.	| No damage.
A few seconds.	| Distinct shock. No damage.

Sibságar, Lakhimpur, Sylhet, Cachár, Nága and Gáro Hills.

5 seconds.	| No damage.
A few seconds.	| Slight. No damage.

Nowgong, Sibságar, Lakhimpur, Sylhet, Cachár, Nága and Gáro Hills.

4 seconds.	| Slight. No damage.
2 seconds.	| Slight. No damage.

Lakhimpur, Sylhet, Cachár, Nága and Khási Hills.

2 seconds. No damage.

from other districts.

2 seconds.	| Slight. No damage.
3 seconds.	| No damage.
8 to 10 seconds.	| No damage. Shock, clear, distinct and marked.



Date.	District.	Time of Occurrence.
No reports received from Goálpára, Kámráp, Sibságar,		
30th August	Sibságar, Jorhát.	3.30 A. M.
No reports received from Goálpára, Kámráp, Darrang, Nowgong,		
September		
1st September.	Khási Hills, Shillong.	5.30 A. M.
Do.	Cachár.	5.45 A. M.
10th do.	Kámráp, Gaubáti.	11 P. M.
Do.	Nowgong.	11 A. M.
Do.	Darrang, Tezpur.	11.15 A. M.
16th do.	Sibságar, Jorhát.	7 A. M.
Do.	Sibságar, Sibságar.	7 A. M.
18th do.	Nowgong, Nowgong.	10 A. M.
Do.	Darrang, Tezpur.	10.30 A. M.
Ascertained that the shocks were not felt at Goálpára, Lakhimpur,		
October		
7th October.	Khási Hills, Shillong.	5.30 A. M.
13th do.	Do.	6.45 A. M.
30th do.	Darrang, Tezpur.	11.30 P. M.
November		
Nil.		
December		
1st December.	Darrang, Tezpur.	6.10 A. M.
Ascertained that this shock was		
7th do.	Sibságar Jorhát.	12 P. M.
Do.	Goálpára, Goálpára.	1.25 A. M.
Do.	Nowgong, Nowgong.	1.30 A. M.
Do.	Darrang, Tezpur.	1.30 A. M.
Do.	Sibságar, Sibságar.	About 2 A. M.
Do.	Gaubáti, (Kámráp).	Do.

Duration.	Extent of damage if any, and general remarks.
Nowgong, Lakhimpur, Sylhet, Cachár, Nágá and Gáro Hills.	
About 5 seconds. | No damage. Slight trembling shock.	
Lakhimpur, Sylhet, Cachár, Nágá, Khási and Gáro Hills.	
1877.	
5 seconds.	No damage.
7 seconds.	Slight shock.
1 min. 10 sec.	No damage.
2 seconds.	Very slight shock. No damage.
8 to 10 seconds.	Sudden and distinct shock not preceded by usual rumbling noise. No damage.
2 seconds.	No damage. The sensation was as of one shock upwards.
Less than a sec.	Nil.
10 seconds.	No damage. One sharp shock preceded by a heavy rumbling noise.
8 to 12 seconds.	Slight shock, but the usual rumbling noise was loud and long.
Sylhet, Nágá and Gáro Hills on the 10th, 16th and 18th.	
1877.	
10 seconds.	No damage.
15 seconds.	No damage.
20 to 25 seconds.	No damage. Sharp shock.
1877.	
1877.	
A few secs. only. | Two distinct but slight shocks. No damage.	
not felt in any other district.	
(?)	No damage.
5 seconds.	Slight shock.
4 seconds.	Do. No damage done.
A full 20 seconds.	Very severe, about half a dozen distinct shocks, the second one very strong and caused much damage. South wall of kutcherry cracked and broken down. Northern walls cracked. Treasury walls cracked in several places. Circuit bungalow walls much cracked. Jail uninjured. Deputy Commissioner's bungalow on the hill suffered most, chimney fell in, causing loss of valuable property.
Less than a sec.	Nil.
5 seconds.	A slight shock accompanied by the usual rumbling noise.
	No damage.

Date.	District.	Time of Occurrence.
7th December.	Barpetá, (Kámrúp).	2·10 A. M.
Do.	Khási Hills, Shillong.	2 A. M.
Do.	N. Lakhimpur.	2·35 A. M.

Ascertained that this shock was not felt in Cachár,

9th December.	Darrang, Tezpur.	12·30 P. M.
		3 P. M.
		8·50 P. M.
Do.	Khási Hills, Shillong.	1·45 A. M.

Ascertained that this shock was not felt at Goálpára, Kámrúp,

11th December.	Darrang, Tezpur.	11·30 P. M.
Do.	Nowgong, Nowgong.	1 A. M.

Ascertained that the shock was not felt in Goálpára, Kámrúp,

18th December.	Kámrúp, Gauháti.	3·35 P. M.
Do.	Darrang, Tezpur.	3·45 P. M.
		4·20 P. M.
		5·15 P. M.
Do.	Khási Hills, Shillong.	3·47 P. M.
Do.	Nowgong, Nowgong.	3·50 P. M.

Ascertained that the shock was not felt in Goálpára, Sibságar,

22nd December.	Darrang, Tezpur.	4 A. M.
Do.	Khási Hills, Shillong.	10·30 P. M.

Ascertained that the shock was not felt in Goálpára, Kámrúp, Nowgong,

29th December.	Khási Hills, Shillong.	9 P. M.
Do.	Cachár, Silchár.	10 P. M.
Do.	Goálpára, Goálpára.	11 P. M.

Ascertained that the shock was not felt in Kámrúp, Darrang,

Duration.	Extent of damage, if any, and general remarks.
Not stated.	Nil.
10 seconds.	No damage done.
2 seconds.	Treasury room cracked in several places. No serious damage.

Sylhet, Gáro and Nágá Hills and Head Quarters Lakhimpur.

8 to 10 seconds.	The first two shocks very distinct. No damage. The
A few seconds.	third shock was very smart, and the rumble and shock
8 seconds.	came almost together. No damage.
5 seconds.	No damage.

Nowgong, Sibságar, Lakhimpur, Sylhet, Cachár, Nágá and Gáro Hills.

10 seconds.	Smart shock. No damage.
3 seconds.	Very slight. No damage.

Sibságar, Lakhimpur, Sylhet, Cachár, Nágá, Gáro and Khási Hills.

5 seconds.	Slight. No damage.
10 seconds.	1st, very distinct with loud rumbling. No damage.
A few seconds.	2nd, slight rumbling, distinct, but no shock.
15 to 20 seconds.	3rd, loud continued rumbling, no shock.
5 seconds.	No damage.
2 seconds.	Sharp shock, no damage.

Lakhimpur, Sylhet, Cachár, Nágá and Gáro Hills.

8 to 10 seconds.	Distinct shock with loud rumbling. No damage.
5 seconds.	No damage.

Sibságar, Lakhimpur, Sylhet, Cachár, Nágá and Gáro Hills.

5 seconds.	No damage.
2 seconds.	Very slight.
5 seconds.	Slight shock.

Nowgong, Sibságar, Lakhimpur, Sylhet, Nágá and Gáro Hills.



IV.—*Sixth List of Birds from the Hill Ranges of the North-East Frontier of India.*—By LIEUT.-COLONEL H. H. GODWIN-AUSTEN, F. Z. S. &c., &c., late Deputy Superintendent Topographical Survey of India.

(Received 16th March; read 3rd April.)

[With Plates X and XI.]

This list is the result of two seasons' Survey exploration in the Eastern Nágá Hills (Mr. A. W. Chennell) and of the low hills near Sadiya and the neighbourhood of the Bráhmakhúnd (Mr. M. T. Ogle). I have again to acknowledge the kind services of the above gentlemen, to whom I owe so much, and who have added considerably to the value of the collection by taking careful measurements in the flesh and recording the colour of the soft parts. The collection is a large one and contains, as will be seen, besides a large number of species already recorded, many interesting birds. Together with the birds included in my paper on the Dafla Hills and Darrang Terai, which I have now introduced and marked with an asterisk, it brings up the total number of species collected during the progress of No. 6 Topographical Survey to 585.

Having now left the service, I much fear that this will be my last contribution in these pages to the avi-fauna of the Eastern Districts. The assistants who have been associated with me hitherto on this pleasant work are being gradually reduced in number; and have either been transferred to other parties, or have proceeded on well merited leave of absence to a distance, so that it is difficult to arrange for collecting with success, and a certain amount of aid is requisite, which only individuals in the country can obtain. When this paper was almost completed, the arrival of Mr. Chennell in England, with another collection of some 800 skins from the North Khási Hills, has enabled me to add a few more species to the list, and there are still some I have not yet identified.

70. URRUA COROMANDA, Latham.

North Khási Hills, (collected by Mr. Chennell).

*71. HUHUA NIPALENSIS, Hodgson.

73. KETUPA FLAVIPES, Hodgson, var. *magnifica*, Swinhoe.

North Khási Hills. The specimen in Mr. Chennell's collection has the tarsus covered with a white down, buffy above, extending to within 1·3 inch of the base of the toes, as recorded by Mr. Swinhoe in his description of *K. magnifica* from Ningpo, (Ibis, 1873, p. 127).

On Mr. Chennell's label I find the following notes:

L. 21 inches, W. 16.5, T. 6.0, t. 3.0, Bf. 1.8. Bill greenish horny, irides golden yellow. Legs and feet dusky grey. The mid toe is 1.75, its claw 1.1, hind toe 1.0, claw 1.25.

These dimensions and the coloration of the feet and legs are much nearer to those of Mr. Swinhoe's bird than to those given by either Sharpe or Jerdon for *flavipes*. In neither of the latter is any mention made of the down covered tarsus, a character so striking that it could hardly have escaped their notice, and one which, besides the vermiculated breast and lower parts, distinguishes the species from *Ceylonensis*.

Swinhoe concludes with the remark that the fine down of the tarsus appears to wear off, but the specimen now recorded is an adult, and though this down may disappear to a certain extent, I do not think the tarsus and the joint above would ever become bare as in *Ceylonensis* and *flavipes*.

*94. CHELIDON NIPALENSIS, Hodgson.

106. BATRACHOSTOMUS JAVENSIS, Horsfield, ♀ ?

This specimen belongs to the Indian Museum, Calcutta, where I found it among some skins that had been sent down by the late lamented Captain John Butler from the Nágá Hills, and I was by the kind permission of the Trustees allowed to bring it to England. It is a most interesting specimen in the rufous phase of plumage, but unfortunately the sex is not marked. It agrees with a specimen of *B. Javensis* ♀ in the collection of Lord Tweeddale, and the description of the species as given in P. Z. S. 1877, p. 435, and the dimensions do not differ materially. I give a description of the Nágá Hill bird, interesting as being found so far to the northward.

Entire plumage rich chestnut brown, a few white feathers at the base of the upper mandible tipped rufous and barred with black. White on chin and throat, some of the feathers on the latter crossed by a V-shaped dark line, but they only extend to the upper breast, this being covered by feathers having large, rounded white centres, bounded on the terminal margin by a narrow dark line and fringed with chestnut; towards the abdomen and flanks the white marks become narrow and lengthened. The wing is unspotted, but conspicuous white feathers margined with black are mingled with the scapulars, and there is a well-marked nuchal collar, each feather crossed by a narrow black line edged terminally by another. There is a slight mottling of dull black on the primaries and secondaries and lower back. The tail is similarly mottled and crossed by 7 pale clear rufous bands, the outer penultimate tail feather has 5 distinct white bars on the outer web, the very short outermost feather has a terminal whitish spot.

W. 5.25 inches, T. 5.5, t. 0.6, Bf. 0.6. Breadth at gape, 1.05, mid-toe and claw 0.75. The long frontal plumes are black, rufous at the base.



This bird is, I think, nearest to *B. Javensis*, *B. affinis* apparently not having any white in front of the eye.

On my submitting this paper and the specimen to Lord Tweeddale he thus wrote to me,—“This Nágá Hill example of the genus, *Batrachostomus* “without doubt belongs to the *B. Javensis* (Horsf. ex Java). I have critically compared the two and cannot detect any difference. It may turn “out to be Mr. Hume’s *B. castaneus*, in which case *B. Hodgsoni* will become a synonym of *B. Javensis*. It is a large form of *B. affinis*, but the “white on the throat seems to extend higher up, as it does in the Javan “species and in *B. cornutus* of Sumatra and Borneo.” Lord Tweeddale does not concur with me regarding the white mark in front of the eye, and says, “it is just as strongly marked in my examples of *B. affinis*.”

130. HALCYON PILEATA, Bodd.

H. atricapillus, Gmel.—Jerdon, Birds of India, Vol. I, p. 226.

♂ L. about 10·3, W. 4·9, T. 4·0, t. 0·58, Bf. 2·3, Bill from nostril 2·15.

The dimensions of the length and wing are much smaller than those given by Dr. Jerdon.

133. CEYX TRIDACTYLA, Pallas.

Dr. Jerdon informed me that he saw this species in a small stream close under the village of Cherra Púnji, but as I never got it myself, I did not record it. Mr. A. W. Chennell has two specimens he shot on the Umthunna River, N. Khási Hills.

*135a. ALCEDO GRANDIS, Blyth.

Also got on the Buri Dihing.

*137. CERYLE GUTTATA, Vigors.

Tenga Páni and Buri Dihing.

147. PALÆORNIS EUPATRIUS, Lin.

L. 21, W. 8·1, T. 13·5, t. 0·8, Bf. 1·5, Bg. 1·2.

Bill deep red. Legs and feet orange yellow.

N. Khási Hills, December, (Chennell).

*152a. PALÆORNIS MELANORHYNCHUS, Wagler.

*171. GECINUS STRIOLATUS, Blyth.

210. SURNICULUS DICRUROIDES, Hodgson.

Mr. Chennell has two specimens from the N. Khási Hills of this curiously plumaged bird, so like the king-crow.

Length 10·0, W. 5·5, T. 5·75, t. 0·7, Bf. 0·8.



*245. *CERTHIA DISCOLOR*, Blyth.

*303. *CYORNIS UNICOLOR*, Blyth.

313. *NITIDULA HODGSONI*, Moore.

A single male specimen was collected for me by Mr. A. Chennell in the Nágá Hills; this is of a richer chestnut below than a specimen from Darjiling. A female was obtained by Mr. Ogle at Sadiya. I give a description of the latter, that in Jerdon being taken from the male.

♀. Above, olivaceous brown, wings and tail dark umber-brown, beneath, all pale rufous buff. Under tail coverts white.

W. 1.75, t. 0.65. The wing is rather shorter than in the male which has it 1.90.

320. *SIPHIA LEUCOMELANURA*, Hodgson.

I now possess two males and three females from Sadiya, two males from the Manipur Hills, and one male from Sibságar, Assam. Dr. Jerdon only describes the male, the female apparently was unknown to him. I therefore give one of a specimen sent me from Darjiling by Mr. L. Mandelli.

♀. Above, brown with an olive cast, darkest on the head, ochraceous on the rump. Wing and tail ruddy brown, ferruginous at the base of the tail feathers and on the wing coverts. Beneath, dingy sordid white, purer on the centre of the abdomen, ochraceous on the flanks. Hind claw well curved. W. 2.3, T. 2.05, t. 0.72, Bf. 0.36.

♂. Sadiya, W. 2.4, T. 2.15, t. 0.85, Bf. 0.30 to 0.35.

Legs, sepia-brown; irides deep brown.

377. *CHLEUASICUS RUFICEPS*, Blyth, var. *atrosuperciliaris*, Godwin-Austen. P. A. S. B., June 1877, p. 147.

♂. Rusty chestnut on the head, same colour, but paler, on the nape and ear coverts: back and wings pale olive-brown, quills tinged rufous, tail brown. A narrow black streak over the eye, beneath dull white with an earthy tinge.

Legs dark plumbeous.

L. about 6, W. 2.85, T. 3.3, t. 0.90, Bf. 0.43.

Maubum Tila, near Sadiya.

Larger than typical *C. ruficeps* and not so white below.

*378b. *SUTHORA DAFLAENSIS*, Godwin-Austen.

*382. *GRAMMATOPTILA STRIATA*, Vigors.



390c. *TURDINUS NAGAENSIS*, Godwin-Austen, [A. M. N. H., Dec. 1877.]

"Above, rich umber-brown throughout with no streaking on the feathers of the head. Beneath, the same tint, much paler, with slight rusty shading into and adjacent to the dull whitish centre of the breast, chin also whitish.

"Irides dark brown, legs and feet light sienna-grey.

"Length about 5.70, wing 2.2, tail 2.2, t. 0.90, Bf. 0.50, hind toe, 0.35, claw 0.3. This species is very distinct from *T. Garoensis* in its deeper umber coloration and smaller size. Particularly is this the case in the legs, feet and hind claw.

"It was obtained by Mr. A. W. Chennell, of the Survey, in the Eastern Nágá Hills."

390d. *TURDINUS STRIATUS*, Walden.

I have compared a specimen from Sadiya of the bird hitherto considered as *T. brevicaudatus* with the type in the Calcutta Museum, obtained by Col. Tickell in Tenasserim, and find that they are, after all, distinct. The Tenasserim form is very strong rufous on the breast, belly and under tail-coverts, the spots on the secondaries are small and triangular, whereas in that from Sadiya they are large and tip the feather. The throat is also grayer in this last. In the "Ibis" for 1876, p. 354, Lord Tweeddale remarks on the highly colored drawing by Tickell of *T. brevicaudatus*, and Mr. Gould has very probably figured an Assam bird, which should stand properly under the title of *T. striatus*, Walden, described in Ann. Mag. Nat. Hist., (4), vii., p. 241, and which Jerdon had very probably compared with true *brevicaudatus* from the Burmah side and considered distinct. This bird is the one I refer to under the title of *T. Williamsoni* in J. A. S. B., Pt. II., 1877, p. 44. I have four specimens from Sadiya (Gáro Hills and Manipur), in all of which the spots on the secondaries are rufous, while in a specimen from the Mulé-it range, Tenasserim, obtained by Mr. Limborg, they are white, thus agreeing with Col. Tickell's drawing of true *brevicaudatus* from the same locality. This specimen is again not so rufous as the type in the Indian Museum, but this is a very variable character in this group, (as may be seen in *Pnoe. squamata*, of which specimens white beneath are often met with,) and probably depends on age. After all *striatus* is only a variety of *brevicaudatus*.

399b. *PELLORNEUM MANDELLII*, W. Blanford, [J. A. S. B., vol. XLI, Pt. II, p. 165, pl. VII., (1872).]

Var. *pectoralis*.

I described this variety of the Darjiling form in the J. A. S. B. vol. XLVI, Pt. II, 1877, pp. 41-42, as it differs a good deal in its markings



from *P. Mandellii* described by W. Blanford from Darjiling, and is the form which extends to the Gáro, Khási and North Cachár Hills, *P. ruficeps* of my First List, [J. A. S. B., Vol. XXXIX, p. 103, (1870).]

Jerdon, when noticing a new species from the Khási Hills, in Vol. II., Birds of India, had *Pel. palustre* in mind.

*401. POMATORHINUS FERRUGINOSUS, Blyth.

405c. POMATORHINUS STENORHYNCHUS, G.-A.

The original description appeared in this Journal, Pt. II., Vol. XLVI. p. 43, (1877), and I have only to add that its nearest ally is *P. ochraceiceps*, Walden, from Burmah; but the above species is larger and has the lower parts pale ferruginous, whilst in *ochraceiceps* they are of the purest white, and it is not so rufous on the head and nape. The legs of *stenorhynchus* are horny grey; in the figure of *ochraceiceps* lately published in the Ibis for 1877, Pl. XIII, the legs appear to be much too blue; should this coloring however be correct, it will mark another point of difference.

Mr. Ogle shot this species on Manbúm Tila, at an elevation of 8,000 feet, not far from Sadiya.

407a. GARRULAX NUCHALIS, Godwin-Austen. Plate X.

The second specimen of this bird was obtained again by Mr. Ogle, on the Kamlangpáni, at 500 ft. I described the first example, obtained also by Mr. Ogle, in the Annals and Magazine of Natural History for November 1876, and I here repeat the original description and remarks upon it. It is figured on the accompanying plate.

"Above, top of head to nape dark slaty grey, succeeded by a broad rich ferruginous collar an inch in breadth, which fades into the olive-green of the back. Wings and tail of a rather darker tint of olive, the latter tipped black; the first four primaries are tipped hoary-grey; the shoulder of wing has a rusty tinge. A narrow frontal band; the lores, with a narrow line over and below the eye, black; this is continued in a streak of dark rusty brown over the ear-coverts; a few white feathers border the black frontal band above. Chin black, extending a short way down the middle of throat; breast pale ashy, with a slight vinous tinge. Cheeks and ear-coverts pure white. Flanks and under tail-coverts dull olive-green. Bill black. Irides purple-lake. Legs fleshy-grey.

"Length 10 inches, wing 4.25, tail 4.6, tarsus 1.7, bill at front 0.9.

"This beautiful species was among a batch of birds lately received from and collected by Mr. M. T. Ogle, of the Topographical Survey, in the Lhota-Nágá hills. It is the representative there of *G. chinensis*, but differs in possessing the broad ferruginous nape, and the neutral grey of the head is of a darker hue. In other respects it is identical, save in some

minor points, such as :—the black of the throat does not extend so far down on to the upper breast ; the lower breast is paler than in *chinensis*, and has a vinous tinge ; the under tail-coverts are pure olivaceous with no ochraceous tint ; and, lastly, the white of the cheek and ear-coverts extends in this new form further down the side of the neck."

*427*b*. *ACTINURA DAPLAENSIS*, Godwin-Austen. [Pl. IV, J. A. S. B., 1876.]

497*d*. *ACTINURA OGLEI*, Godwin-Austen. Plate XI.

This beautiful new form, discovered by Mr. M. T. Ogle, was described in J. A. S. B., Vol. XLVI, Pt. II, 1877, p. 42, from Manbúm Tila on the Tengapáni River, near Sadiya. It is now figured.

*430. *SIBIA PICAOIDES*, Hodgson.

*432. *MALACOCERCUS TERRICOLOR*, Hodgson.

*498. *RUTICILLA HODGSONI*, Moore.

*534. *PRINIA SOCIALIS*, Sykes, small variety.

*535. *PRINIA STEWARTI*, Blyth.

562*a*. *PHYLLOSCOPUS FULIGINIVENTER*, Hodgson, sp.

Horornis fuliginiventer, Jerdon. [Birds of India, Vol. II, p. 162, No. 525.]

A dull but well marked ring round the eyes, an indistinct supercilium of same colour as the breast. All above very dusky bistre-brown with an olive tinge. Beneath dingy oil-green, paler on chin ; under tail-coverts rather lengthened. Irides dull brown, legs ochraceous green. Obtained at Sadiya.

L. 4·25, W. 2·15, T. 2·0, t. 0·87, Bf. 0·34.

564. *REGULOIDES TROCHILOIDES*, Sundeval.

♂ from Noa Dihing, March 6th. Compared with specimens in British Museum.

Lord Tweeddale writes—"Has your specimen got white margins to the outer tail feathers? If it has so, it will be true *P. viridipennis*, and which is probably nothing but *P. presbytes* of S. Müller. Seebohm thinks that *P. trochiloides*, *viridipennis*, and *presbytes* are one and the same."*

576. *ABROORNIS AFFINIS*, Hodgson.

This bird I have only received from the Nága Hills ; it has a bright yellow ring round the eye.

* Compare Stray Feathers, V, 1877, pp. 330, 504.—Ed.

572. *ABRORNIS FLAVIGULARIS*, n sp.

Description : Above ash grey, purer grey on rump, rather darker on the head. Wings pale umber-brown. Tail ash-brown, the two outer feathers white on the inner web, the next with a narrow edging of white. Lores white, ear-coverts white and grey. Chin pure yellow fading on throat; breast, nape, flank and thighs greyish white, whitish on the breast; a very faint yellow tinge on the abdomen; under tail-coverts white. A small patch of yellow on inner shoulder of the wing,

Bill dark above, buff below.

W. 1·84, T. 1·8, t. 0·67, Bf. 0·3.

Hab.—Sadiya. (Mr. Ogle.)

Having failed to identify this bird with any species I have examined, I have now described it more fully; it is the specimen I noted as probably new under the above title in the J. A. S. B., Vol. XLVI, Pt. II, p. 44, (1877).

It is nearest to *A. xanthoschistus*, having the same coloured head and form of bill, but its entire ashy upper surface distinguishes it well from all the species I am acquainted with.

*586. *HENICURUS SCHISTACEUS*, Hodgson.*587. *HENICURUS SCOULERI*, Vigors.*588. *HENICURUS SINENSIS*, Gould.*590a. *MOTACILLA HODGSONI*, G. K. Gray.*592. *CALOBATES MELANOPE*, Pallas.594. *BUDYTES CITREOLA*, Pallas.

♀. Pengapáni, W. Sadiya. April 24th.

The black band on the nape is hardly developed at all.

594a. *BUDYTES CITREOLOIDES*, Hodgson.

♀. Brahmaputra. April 5th.

The white of the wing has a slight wash of yellow on it.

*612. *CUTIA NIPALENSIS*, Hodgson.*621. *PROPARUS CHRYSÆUS*, Hodgson.625a. *STAPHIDEA PLUMBEICEPS*, Godwin-Austen.

Ann. Mag. Nat. Hist., Dec. 1877.

Original Description : "Head (sub-crested) ash-grey, purer behind; feathers narrowly edged paler. Back pale olive-brown, a few feathers

pale-shafted. Wings umber-brown. Tail darker, the four outer feathers tipped with white, increasing outwards diagonally. Lores pale grey. The ear-coverts only to just beneath the eye chestnut, the feathers white-shafted. Chin, throat, and all the lower parts white. Flanks pale sepia-grey; under tail-coverts the same, tipped white.

“Irides reddish brown. Legs umber.

“Length 4·6 inches, wing 2·3, tail 9·05, tarsus 0·7, bill at front 0·3.—Obtained near Sadiya and Brahmakhúnd.”

A near ally is *Staphidea castaneiceps*, Moore, very common in the Khási and Nágá Hills, while another very distinct species is *Staphidea torqueola*, Swin.; but in this last the chestnut commences at the base of the lower mandible, passes under the eye and round the nape in a broad band of chestnut-brown, and the last three tertiaries are margined white on the inner web. This is absent in the Assam species.

In my note-book I find that I obtained one example in the Dikrang valley, Dafla hills, which I shot at camp No. 9; but this was subsequently lost somehow or other, and therefore I did not insert it in the List of Birds from the Dafla Hills, published in the Society's Journal.

Can this be *Ixulus striatus*, Blyth? Blanford in J. A. S. B., 1872, p. 166, says the Darjiling bird is the same as the Tenasserim type in the Calcutta Museum, but mentions that it has a rufous supercilium, which none of my specimens possess.

[Since writing the above, I have received from Mr. W. Blanford, in a letter from Calcutta in reply to some questions I wrote to him regarding this species, *Ix. striatus*, some remarks which I now quote. “I have two specimens of the Sikkim bird; I have re-compared them with the type from Tenasserim, and I cannot understand how I can have identified the two. The Tenasserim bird is, as Blyth describes it, greyish brown (ashy brown according to Tickell), the cap may have been a trifle darker, but very little, not so distinct I should say as in the Sikkim bird, and the white shafts are far more conspicuous in the Tenasserim type. Above all, the bill is much larger in the latter; the difference is so marked that I think I must have compared a Sikkim specimen differing from those I have now. The cheek patch is distinct but faint. In the specimen from Sikkim, (*Ix. rufigenis*, Hume) which I now have, the rufous supercilium is only indicated posteriorly.” This last title was given to the Sikkim bird by Mr. A. O. Hume in Stray Feathers, Vol. V, p. 108. Mr. Blanford has now followed up his letter by sending me two specimens from Mr. Mandelli's collection of this Darjiling form, and on comparison I find that it is quite distinct from *plumbeiceps*. This last has the head of a decided ash-grey colour, and the feathers are more lengthened behind, so as to give a sub-crested appearance. Bill shorter and deeper. Legs stouter, altogether a larger bird. In one



specimen from Darjiling, there is an extension shewn of the rufous of the ear-coverts round the nape, of which there is not a trace in the Sadiya examples. These are the dimensions of *rufigenis*. W. 2.45, T. 0.6, Bf. 0.47.

The wings run about equal. This genus presents us with an interesting example of modification of plumage in areas that are in a great measure separated now physically. We appear to have 5 forms:—

1. *Staphidea castaneiceps*, Moore, (1854). Gáro, Khási and Nága Hills.
2. „ *striatus*, Blyth, (1859). Tenasserim.
3. „ *rufigenis*, Hume. Sikkim Hills.
4. „ *plumbeiceps*, Godwin-Austen. Sadiya, Eastern Assam.
5. „ *torqueola*, Swinhoe. W. China.]

669. *GARRULUS BISPECULARIS*, Vigors.

This Himalayan Jay was obtained by Mr. Chennell at Shillong, and is in his collection.

*838. *SYPHEOTIDES BENGALENSIS*, Gmelin.

873. *RHYNCHLEA BENGALENSIS*, Linnæus.

North Khási Hills. Mr. Chennell.

In the neighbourhood of Calcutta these birds breed as early as March and April; two chicks were brought to me about the middle of the former month.

879. *IBIDORHYNCHUS STRUTHERSII*, Vigors.

♂. Noa Dihing.

W. 9.25, T. 5.5, t. 1.7, Bf. 3.02.

907a. *PODICA PERSONATA*, G. R. Gray.

This bird, hitherto only recorded, on the Indian side, from Cachár, was found by Mr. Ogle on the Noa Dihing river near Sadiya; the specimen is a male, and has been compared with those in the Indian Museum from Tenasserim.

W. 9.5, T. 5.4, t. 2.0, Bf. 2.15, bill to nares 1.05.

908. *PORZANA AKOOL*, Sykes.

In Mr. Chennell's collection from North Khási Hills.

Length about 9.25, W. 4.4, T. 2.3, t. 1.8, Bf. 1.0.

Bill dusky green, yellow below, irides red brown, legs and feet dusky lake.

910. *PORZANA PYGMEA*, Naumaun.

Near base of the Hills. N. Khási. Obtained by Mr. Chennell.

935a. *GORSACHIUS MELANOLOPHUS*, Raffles.

Dipur Bhil. Eastern Assam, March, (Chennell).



The discovery of this interesting bird in this part of India is noteworthy, as I do not believe it has hitherto been obtained any where in India, certainly never recorded. Up to the present it has been only known as a native of Japan, Sumatra, Philippines, Arrakan (Ramri Island), Ceylon and the Nicobars (Hume). The specimen, a male, agrees well with Mr. A. O. Hume's excellent description from the last-named locality in "Stray Feathers, Vol. II, p. 313." Mr. Chennell's dimensions in the flesh are "wing 10·7, tail 5, tarsus 3·0, bill at front 1·9. Bill dark horny;" these I have checked and find correct, the wing I make exactly 11·0. The tarsus of the Nicobar bird appears to be very much shorter than in Schlegel's description and in this specimen from Assam.

950. *SARCIDIORNIS MELANONOTUS*, Pennant.

There is a head of this species in Mr. Chennell's collection from Upper Assam.

*981. *LARUS RIDIBUNDUS*, Linn.

*987. *STERNA MELANOASTRA*, Temminck.

Notes on Species recorded in former Lists.

79. *ATHENE CUCULOIDES*.

Mr. Chennell writes me an interesting account connected with the habits of this bird "One evening last January while in search of *Polyplectron*, several of which were calling about my camp at Gorhanga, I came upon two birds struggling desperately on the ground. I shot both, one turned out to be an owl, *Athene cuculoides* ♀ and the other a thrush *Myiophonus temminckii* ♂. The little owl had so furiously attacked the thrush that even in death its strong talons were firmly fixed in the victim's back."

157. *PICUS MACUL*.

In the colour of the ear-coverts there is, I find, very great variance from pure white to pale earthy brown; they are white in a female from Sadiya.

311. *MUSCICAPULA AESTIGMA*.

The young bird is dull umber-brown above, the feathers tipped pale rufous and edged darkly, giving it a very speckly appearance. Upper tail coverts rufous umber. Secondary coverts forming a narrow wing bar, 3 last secondaries edged in the same way. Beneath white, some of the feathers tipped dark brown. Wings and tail ashy umber-brown.

From Shillong Peak. July, (*ex coll.* Chennell.)

316. *NILTAVA GRANDIS*.

I have a specimen of this species in its young plumage which is worth description.

Above, brown with a rufous shade, the feathers of the head shafted ferruginous, those of the wing coverts, lower back and rump broadly tipped with the same colour and edged black. Tail dark chestnut brown, wings umber-brown. Beneath, breast ferruginous brown with some dusky edgings, giving a slightly barred appearance, paling to whitish on abdomen.

330. *PNOEPYGA PUSILLA*, var.

A specimen in Mr. Chennell's collection is in a very interesting stage of plumage. It is uniform brown, the feathers not so scale-like as usual, only a very few of the feathers on the lower back having terminal spots to them; in size and form of bill it is the same as the type. I was at first inclined to consider it distinct, but it is better to wait until we see more similar specimens before naming it, for it appears immature. The wings are rusty umber-brown, chin pale, breast and belly ashy umber with no bars or markings.

W. 1·8, T. very short, t. 0·7, Bf. 9·43.

From the N. Khási Hills.

346. *PITTA CUCULLATA*, Hartlaub.

I have seen a specimen in Mr. Chennell's collection which he obtained in the N. Khási Hills, and he only saw one other. I have already alluded to the apparent rarity of the species in these Hills.

386a. *PYCTORHIS ALTIROSTRIS*, Jerdon.

= *griseigularis*, Hume.

I observe that Mr. Hume is still of opinion that his Bhútán Duár bird is distinct from *altirostris*, and in Stray Feathers, Vol. V, No. 2, p. 116, he has named it *griseigularis* (relying on Dr. Jerdon's description being correct). Had Mr. Hume looked up the "Fifth List of Birds from the N. E. Frontier," J. A. S. B., Vol. XLV, Pt. II, p. 197, he would have seen that after the intimation of the re-discovery of the species (Ann. Mag. Nat. Hist., Jany. 1876) the type of *altirostris* turned up in the British Museum, and that my specimens had been compared with it, leaving no doubt in my mind that they are identical, both in plumage and bill. Mr. Hume's specimens and my own, moreover, come from the same line of country, the great plain north of the Brahmaputra. Dr. Jerdon's description is short, but applies very fairly in every way, save in respect to the bill, which is deeper than in *Sinensis*. Jerdon says "making an approach to *Paradoxornis*," by this he may have intended to convey only a very slight approach. The following appear to be the principal differences in the description of the plumage.



Above "slightly brownish ferruginous," Hume, Vol. V, or "rather dark ferruginous brown," Hume, Vol. IV. = "pale reddish brown," Jerdon.

Beneath "dull rusty," Hume, Vol. V, or "Brownish buff deeper coloured &c.," Hume, Vol. IV, = "pale fulvescent," Jerdon.

Under wing-coverts "pale yellowish fawn," Hume, Vol. V, = "pale ferruginous," Jerdon.

When such distinctions as these are made the basis on which to found new species, it is I think advisable to wait, and if possible compare with the type. But in *altirostris* we have one very marked character which Dr. Jerdon did not overlook, *viz.*, "forehead and streak over the eye hoary grey." No two men agree in describing various shades of brown, olive-green &c., an important element being the kind of light the skins are placed in, and individual sensitiveness to colour. It is satisfactory to know that the type of *altirostris* has been found, otherwise we should have been left in a cloud of doubt regarding even its very existence, for in *Stray Feathers*, Vol. III, p. 116, an idea is thrown out that Dr. Jerdon had got hold of a variety of *Pyctorhis sinensis* when he was at Thyet-Myo. Even had the type of *altirostris* been lost, I hold it would have been better to consider it as re-discovered in Assam, and then have waited for it to turn up again on the Irrawady (where I am sure it will be found*) before giving the Assam bird a new title.

427c. *ACTINURA EGERTONI*, Gould. Var. *Khasiana*, Godwin-Austen.

This is referred to in my list of Daffa Hill Birds and is the species noted as near *Egertoni* in my First List.

437a. *MALACOCERCUS (LAYARDIA) ROBIGINOSUS*, Godwin-Austen, described in J. A. S. B., 1874, p. 164, is the *Pyctorhis longirostris*, Hodgson, of Moore's Catalogue of Birds in the Indian Museum. I have compared my specimens with the type and only observe that those from Eastern Assam are larger. I was misled into describing it under a new name by a specimen which is only a slight variety of *Pyc. sinensis*, labelled wrongly *P. longirostris*, in the British Museum. At the time I described *M. robiginosus* the Indian Museum birds were still packed away and not to be got at, and I trusted to the correctness of Mr. Gray's identification of the British Museum bird. I was further misled by *longirostris* being placed in the genus *Pyctorhis*, with which it has no affinity, but is a true *Malacocercus*.

* It has been re-found by Mr. Oates, see *Stray Feathers*, V, p. 249.—Ed.



531a. ORTHOTOMUS ATRIGULARIS, Temminck.

= *flavi-viridis*, Moore. Dunsiri Valley, Assam.

On comparing this with a specimen from Tenasserim collected by Mr. O. Limborg, I notice that in the former the chestnut on the head does not extend so far back on the nape as in the latter, and in a specimen from the Gáro Hills it is confined to the frontal part of the head only. Assam birds have the darkish sub-terminal tip to the tail feathers as mentioned by Mr. Moore in his description. The abdominal portion is not so pure a white in the Assam bird.

619a. MINLA RUFIGULARIS, Mandelli.

This is *Alcippe collaris*, Walden.

I have compared a specimen sent home lately by Mr. Hume and find it identical with the Assam form. Mandelli's title has priority.

619b. MINLA MANDELLII, Godwin-Austen.

Through the kindness of Mr. P. L. Selater I have been able to compare Mr. Hume's *Proparus dubius* from South Burma with this bird; it is clearly distinct, one of those interesting representative races we so often find at the extreme limit of range. *M. dubius* is much paler beneath and has not got the white markings on the nape. It would be conferring a great service to ornithology if Mr. Hume would always send home similar doubtful species, which can only be satisfactorily determined by comparison with types in public and private collections.

V.—*An Account of the Tidal Observations in the Gulf of Cutch, conducted by the Great Trigonometrical Survey, under the Superintendence of COLONEL J. T. WALKER, C. B., R. E., during the years 1873-74-75. Compiled from the G. T. Survey Reports by CAPTAIN J. WATERHOUSE, Assistant Surveyor General.*

Origin and Object of the Observations.—In his Report on the Operations of the Great Trigonometrical Survey for 1866-67, Col. Walker writes :

“Dr. Oldham, the Superintendent of the Geological Survey of India, has recently drawn the attention of the Government to certain questions which have been raised regarding secular changes in the relative level of the land and sea, which are believed to be going on in various parts of the Bombay Presidency, and more particularly at the head of the Gulf which separates the province of Cutch from that of Kattywar. Dr. Oldham recommends that certain points should be selected on the south coast of Kattywar, and as far up the Gulf as possible, and that the existing relative levels of land and sea should be determined at those points by accurate tidal observations carried over as long a period as possible, the tidal stations being connected by lines of levels. Thus, by repeating the operations at a time sufficiently distant to allow the secular changes to reach an appreciable magnitude, this question, which is of much scientific importance, will be satisfactorily settled.”

The Government of India sanctioned the observations being made, and Col. Walker was making arrangements for carrying them out, when a very considerable reduction in the expenditure of the Survey Department, in consequence of the financial difficulties in 1869-70, caused the indefinite postponement of the operations. It was not until August 1872 that steps could be taken for commencing them.

The delay which thus took place is, however, not to be regretted, because it resulted in the investigations being carried on in a more complete and elaborate manner than had been originally contemplated, with a view to acquiring more comprehensive and accurate results than were at first desired.

Happening to be present at the Meeting (in Edinburgh) of the British Association in 1871, Colonel Walker ascertained that a Committee of the Association, presided over by Sir William Thomson, had initiated a system of tidal investigations which was anticipated to secure scientific results of the highest value. On studying the details of these operations he found that his original programme, which contemplated tidal observations of only a few weeks' duration, would be inadequate to detect the existence of minute

secular changes in the relations of land and sea, and that no conclusive results could be obtained unless the observations were carried over a period of rather more than a year at the commencement, and a corresponding period at the close, of the investigation. He further saw that if this were done, the value of the operations would be greatly increased, because the results would not only serve the purpose for which they were originally contemplated, but would materially contribute towards the attainment of the better knowledge of the law of the tides, which is considered by the British Association to be so important a desideratum, and which is expected to lead to an evaluation of the mass of the moon, to definite information regarding the rigidity of the earth, to an approximation of the depth of the sea from the observed velocities of tide-waves, to the determination of the retardation of the earth's rotation due to tidal friction, and also to the various practical benefits which necessarily accrue from accurate predictions of the height of the tide at any given time.

Preliminary Preparations.—With the sanction of the Secretary of State for India, Lieut. (now Captain) A. W. Baird, R. E., Assistant Superintendent G. T. Survey, who was then in England on furlough, was deputed to study the practical details of the mode of tidal registration and of the harmonic analysis of the observations, which were recommended and practised by the Tidal Committee of the British Association.

Lieut. Baird also tested at Chatham a new self-registering tide-gauge constructed by Adie, the well-known optician and mathematical instrument-maker, on the same principle as those he had previously sent out to India, which were provided with barrels of unusual length (five feet) in order that the tidal curves might be drawn on the largest scales practicable. The new tide-gauge was on the same pattern, but with a few modifications, the most important of which was the substitution of a chronometer escapement instead of a pendulum or gravity escapement for the driving clock, in order to permit of the instrument being erected on positions where the concussions of the sea waves would interfere with and perhaps stop the action of a pendulum clock. On trial it was found to work very satisfactorily.

No tidal registrations can be deemed complete without simultaneous registrations of the condition of the atmosphere, because it is well known that the rise and fall of the tides on a line of coast is materially influenced by the direction and force of the winds, and that it also varies inversely with changes in the barometric pressure. Arrangements were therefore made for supplying each tidal station with an anemometer and a barometer, both self-recording. The anemometers registered both direction and velocity and were similar to Beckley's, but smaller, in order to be light and portable. The barometers were aneroids, because safely portable self-registering mercurial barometers could not be obtained.

Selection of Stations.—On Col. Walker's return to India, in November 1872, he deputed Lieut. Baird to make a reconnaissance of the Gulf of Cutch, with a view to selecting tidal stations, and more particularly to ascertain how the instructions which had been received from the Government to establish a station "at a point as far into the Runn of Cutch as possible to which the tide has free access" could be best carried out. For a point to have free access with the sea it is necessary that it should always have at least 4 or 5 feet of water over it at lowest tides, and also that the sea should approach it directly, and not through tortuous channels; the point must also be either on the edge of the mainland or at no great distance beyond, because of the difficulty and expense of constructing a station on the foreshore. It seemed not improbable that it might not be possible to find a point at the edge of the Runn which would satisfy all the requisite conditions.

Lieut. Baird proceeded first to Júria Bandar, close to the head of the Gulf, where he fitted up a country boat for navigating the creeks and channels of the Gulf, and secured the services of an experienced pilot to accompany him in his explorations. After a month's cruising about and long searching along the muddy foreshores of the Gulf, three places well adapted for tidal observations were found. 1st, Nawánár Point, midway up the Gulf on the Cutch coast, 15 miles from Mundra; 2nd, Hanstal Point at the head of the Gulf, about 18 miles from Júria, and 3rd, Okha Point on the Kattywar coast, just at the mouth of the Gulf, opposite the Island of Beyt. At Nawánár there was a minimum depth of 19 feet of water within 336 feet of a site for a station; at Hanstal 72 feet within 160 feet of a site for a station, and at Okha 23 feet within 220 feet of a site for a station. Nawánár is about 9 or 10 and Hanstal 16 miles from the nearest village where drinking water can be procured; Okha Point has Beyt within 1 mile, but a boat is required for communication with it.

The three places selected were considered to be well adapted for the operations, which was the more fortunate in that Lieut. Baird believed them to be the only suitable points to be met with for the purpose. It is to be regretted, however, that an intermediate point could not be found on the Kattywar coast, between Okha and Hanstal, for Nawánár being on the opposite coast had to be connected with the other two stations by a very long line of levels passing round the head of the Gulf; and, as it afterwards turned out, Nawánár proved unsuitable by constant changes in the configuration of the foreshore.

Preliminary Arrangements.—The stations having been selected, preliminary arrangements were commenced.

The first question to be decided was whether the tide-gauges should be set up on stages erected in the sea beyond the low-water line, or on

masonry platforms constructed on shore at the high-water line. It is obviously desirable that the communication between the surface of the ocean and the gauge should be as direct as possible, in order that the tidal curve may be accurately delineated. Thus, it is usual to erect tide-gauges in ports or harbours where the piers, quays and landing-stages constructed for the requirements of the shipping present facilities for their being set up in the vicinity of deep water. In the Gulf of Cutch, however, the stations were all at a distance from the nearest inhabited localities and presented no facilities whatever; for not only building materials and food for the workmen, but even fresh water, had to be brought to them from considerable distances. It was thus imperative that the plan of operations should be of the simplest nature possible, so as to be carried out with the least cost and the greatest expedition. Had any jetties or piers been available for the operations the stations would have been erected on them, but under existing circumstances it was only possible to connect the tide-gauges with deep water by erecting stagings for them in the sea; and these would have had to be very strongly built to withstand the full force of the sea, without undergoing any displacement whatever, and that, not for a short time only, but for several years, so as to include both the first series of tidal registrations, taken to determine the present relations of the land and sea, and the final series which will have to be taken to determine the future relations some years hence. The stagings would, moreover, have had to be connected with the land by piers, in order to permit of ready access to the instruments at all times. The cost of such stagings and their connecting piers would have far exceeded the funds available, and therefore Col. Walker decided, though with some reluctance, on having the tide-gauges set up on shore, over wells sunk near the high-water line and connected with the sea by piping.

Final Arrangements.—The following is a brief sketch of the arrangements adopted:

Masonry wells of a diameter of about 3 feet were sunk at the stations to a depth of several feet below the lowest tides; in these wells iron cylinders with an internal diameter of 22 inches, slightly exceeding the diameter of the float of the tide-gauge, were set up vertically and connected with the sea by an iron piping carried along the shore down to the low-water line, where a flexible piping was attached and carried out into deep water. The flexible piping terminated in a rose suspended by means of buoys a few feet above the bed of the sea, in order to prevent the entrance of silt as much as possible, and was attached to the iron piping in such a manner that it might be readily removed and cleaned whenever necessary. The tide-gauges were set up over the cylinders, and their iron bed-plates indicated the planes to which the tidal measurements were referred; they were connected by

levelling with permanent bench-marks fixed in the ground in the vicinity of the stations.

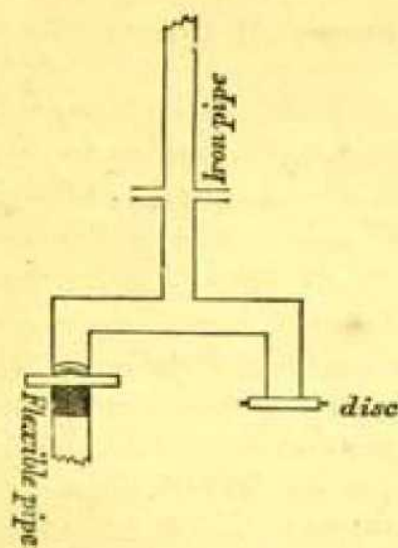
The iron cylinders were made up in sections of 50 inches in length, a sheet of wrought-iron being bent to the size required and rivetted to form a cylinder, a cast-iron flange was fitted on to each end and the faces of these carefully turned so as to fit exactly. The bottom section had a flat iron plate carefully screwed on to one end, so as to form the bottom of the well, and the whole when bolted together formed a water-tight well into which water could only enter through the piping connecting it with the sea. The size of the cylinders was decided on so as to utilise the iron sheets most economically, and when finished four men could carry one section. Before being let into the wells they were well painted over, inside and outside, with tar in order to keep them from rusting. The level of the top flange of the cylinder was about 6 feet above high-water spring tide, and about 2 feet 6 inches above the floor of the observatory. A board fitted on and screwed to the top of the cylinder, with holes for the float-bands to pass through, prevented anything falling accidentally inside the cylinder.

The rigid iron piping was ordinary gas-pipe in lengths of about 14 feet, with an internal diameter of 2 inches, which had been computed to be sufficient to permit of the transmission of the tidal wave from the sea to the cylinder in the well without sensible retardation, so that the height of the water in the cylinder should always be the same as that of the surface of the sea. In order to render the connections perfectly water-tight, as well as to facilitate the joining together of the lengths of piping, these were fitted with cast-iron flanges made to screw on to each end.

The piping was connected with the bottom of the cylinder, at 9 inches above it, by a small bend, and was then brought up vertically outside the cylinder to a height 1 or 2 feet below the lowest high-water. At this point was another bend with a stop-cock in it, and the pipe was then taken straight out down to the sea along the slope of the shore to reach low-water springs.

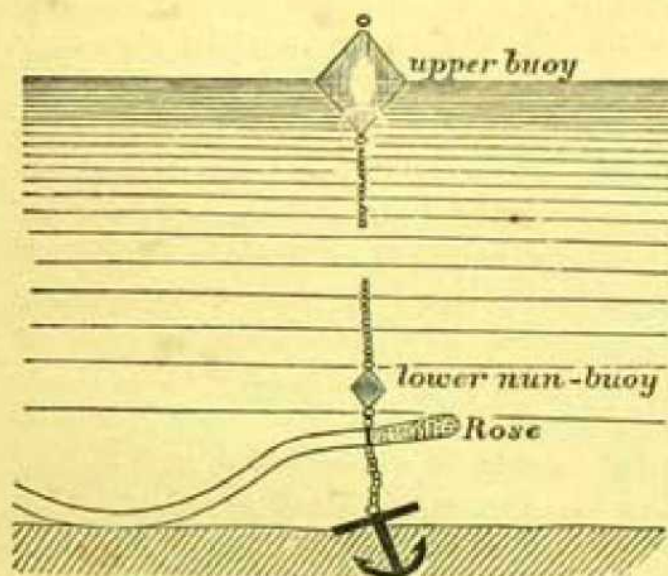
The rigid and flexible pipes were connected together by means of the following arrangement:

To the end of the rigid iron pipe a brass connecting piece, made as shown in the figure, was fitted, having two outer extremities, to one of which a flexible two-inch suction-pipe was fixed and the other closed by a brass disc with a good washer. When the flexible pipe had to be examined for cleaning, the brass disc was unscrewed and a short length of spare flexible piping with a rose at its end fitted on, and taken out to deep water temporarily. The original pipe was then taken off and cleaned, the disc being screwed on for the time in its place; then when finished the long pipe and disc were replaced in their original positions. The flexible pipe was



two inches in diameter with copper inside, just the same as the suction-pipe. It was provided in lengths of 50 or 60 feet, and in smaller one of 20 feet for temporary use only. The lengths were fitted with couplings and unions for connecting them with each other.

Lengths of this suction-pipe were joined on to the end of the iron piping in the manner above described, and taken out to deep water. At the end of the outer length a copper rose, of about 15 inches in length, 2 inches in diameter, and having about 150 holes of $\frac{3}{16}$ of an inch bored in it, was screwed on. This rose was sustained a few feet from the bot-

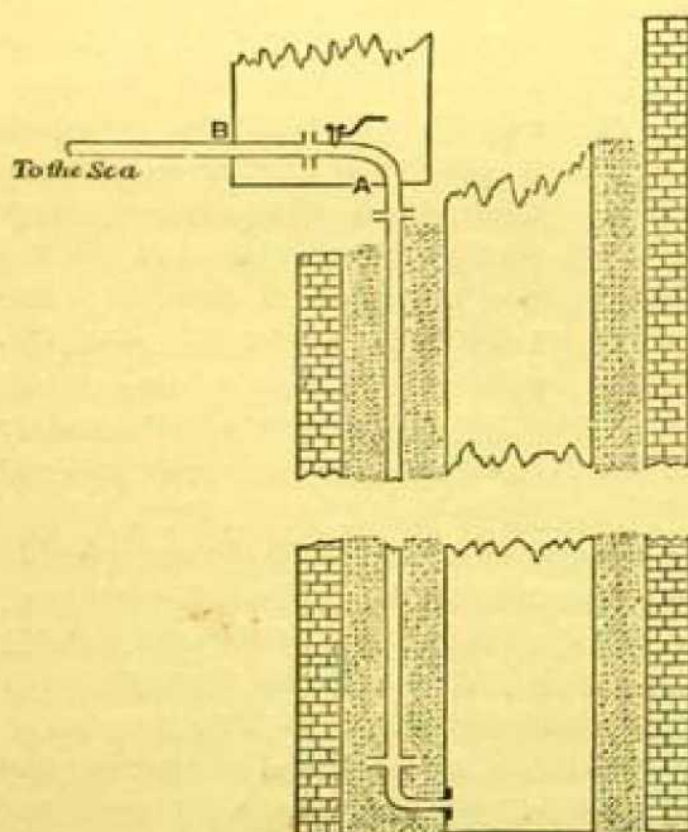


tom, being attached to a small nun-buoy by a chain and shackle with swivel, the whole being held in position in deep water by an anchor. To the top of the small nun-buoy a chain was attached, to which was fixed the large buoy floating on the surface, with plenty of slack chain to allow for rise and fall of tide, and this buoy also served to mark the position of the flexible pipe. The arrangement will be understood by reference to the annexed figure.

The level of the water in the well should obviously always coincide with that of the sea, otherwise the registrations of the gauge are worthless; it is therefore imperatively necessary to compare the inside and outside levels from time to time, in order to remove all doubt as to the efficiency of the communication between the well and the sea. For this purpose an ordinary gauge was attached to a pile driven into the bed of the sea, and its zero was connected with that of the self-registering gauge over the well, by spirit levelling, and thus a comparison of the levels could be readily made whenever desirable. On taking these comparisons during certain trial observations at Bombay, Captain Baird was surprised to find that while the levels were generally identical, there were occasional large differences which at first could not be accounted for; eventually, however, he succeeded in tracing them to the accidental presence of air inside the piping.

He soon devised a simple method of expelling the air and restoring the requisite identity of level, by fixing a stop-cock for the exit of the air at the vertical bend, where the iron piping, after rising from the bottom of the well to within a few inches of the surface of the ground, begins to slope downwards towards the sea. This bend has necessarily to be made at a point a little below the level of the lowest high-water tide, and, consequently, on opening the stop-cock at high-water, all the air inside the pipe is of course immediately expelled, and then the water inside the well at once assumes the same level as that of the sea. But for this expedient it would have been impossible to carry on the operations continuously for any length of time, as there was found to be a decided tendency for air to collect in the pipes. It was most fortunate that this was discovered during the experimental observations at Bombay, for there stop-cocks could be readily constructed and attached to the piping, which could not possibly have been done at either of the stations in the Gulf.

At Okha Captain Baird found some difficulty in keeping the stop-cock dry and having access to it. He therefore had a water-tight box 3 feet long and 1 foot square



made in halves and fitted over and under the stop-cock, holes having been cut to admit the pipes, and carefully caulked up after the box had been fitted over the pipe (see figure); in this way no water could get at the stop-cock except over the top of the box. Underneath the first 7 or 8 feet of the pipe leading to the sea, a layer of mud and stones of considerable thickness was made, and a wall of similar material built all round the stop-cock, leaving a space about 3 feet square for standing in and steps for getting down to it; also mud and sand were thrown down

between the iron cylinder and the masonry wall right up to the level of the stop-cock bend. It was found that by this means the stop-cock was quite dry and access could be had to it at any time however high the tide was.

Captain Baird spent the recess of 1873 at Bombay in preparing for the operations of the field season of 1873-74. Cylinders as above described

were constructed in suitable lengths to be easily transported to the tidal stations and there put together. The several self-registering instruments which were to be employed—the tide-gauges, the aneroid barometers and the anemometers or anemographs—were overhauled and put into good working order. The tide-gauges were tested by being employed to register the tides in the harbour of Bombay for several weeks continuously, and were set up over wells connected with deep water by piping, in order that the experimental observations should be taken under precisely similar circumstances to the actual observations. Sundry alterations and improvements were made in them, and in fact everything was done which could be thought of to ensure the instruments being found in a satisfactory condition when they were set up for work at the tidal stations. It was a matter of great importance to have all this done at Bombay, because the advantages of excellent workshops and skilled artificers were not to be met with in the places where the instruments had to be set up for observation.

While in Bombay, Capt. Baird also constructed three portable observatories for erection at the tidal stations. These observatories were made in such a manner as to be readily put together, or taken to pieces and re-erected at any other place where they might afterwards be required. They were about 12' \times 9' \times 9' and about 12 feet high in the centre, the roof sloping from the ridge to the sides which were about 8 feet high. They were clinker-built, but it was found necessary to cover them with a tarpaulin to keep out the heavy rain during the monsoons.

Operations at Okha Station.—Okha station being near the mouth of the Gulf and the nearest to Bombay, where all the preliminary arrangements were made, was selected as the first to be taken in hand. There all the instruments and stores, and the European assistants, including Mr. Peters, a skilled artificer of the Bombay Harbour Works, whose services had been obligingly placed at Capt. Baird's disposal by Major Merewether, R. E., 6 sub-surveyors and 24 men were sent, on the 13th October, 1873, direct from Bombay in a large *pattimar* (or native sailing vessel). Meeting with contrary winds, the "Kotia Romani" took such a long time to perform the voyage that Capt. Baird began to fear that she was lost with all hands on board; at last, however, she arrived with her passengers and crew nearly starved, for they had only taken a week's provisions for a voyage which lasted a fortnight. On the 5th November the stores were landed and the first thing to be done was to make an excavation for the iron cylinder. At Okha, as well as at Nawánár, the soil being sandy, it was necessary to take measures to prevent the sides of the well from falling in during the excavation, and therefore a masonry well of sufficient diameter to receive the iron cylinder and vertical shaft of the piping had to be sunk in much the same manner as the wells so frequently used in this country for the foundations of bridges and aque-

ducts. The operations were considerably facilitated by the employment of Bull's Patent Dredgers for scooping out the soil under the sinking masonry. (At Hanstal, where the soil was firm, the masonry well was unnecessary). The masonry well was completed to the full depth of 25 feet by the 4th December, and by the 20th the cylinder had been set up, the piping connected with the sea had been laid out into deep water, the observatory was erected and the several self-registering instruments—a tide-gauge, an anemometer and an aneroid barometer—were all in position and ready for the preliminary trial of their performances. By the 23rd everything was complete, the instruments were all working well, and Capt. Baird was about to proceed to the next station, when an accident happened through a native boat drifting down past the station about 3 in the morning of the 24th December, and dragging her anchors across the flexible pipe, smashing it and carrying off a large portion of it as well as the buoys, anchors &c. Being on the spot, Capt. Baird was able to rectify the damage and to arrange for protecting the piping by laying out and anchoring hawsers around it. Guards were also provided to prevent boats from approaching the buoys. Thus this accident, though very annoying at the time, proved of use in showing the necessity of taking special precautions for the protection of the piping from injury. Similar measures were taken at the other stations, and these precautions were essential to the success of the operations, because in case of any similar accident happening to injure the piping, the native subordinate who would ordinarily be left in sole charge of the station to keep the instruments in order and look after their performances, would be unable to repair the damage without the personal help of Capt. Baird or the European assistant, to obtain which would probably cause suspension of the tidal registrations for a fortnight or more, and greatly impair the value of the observations.

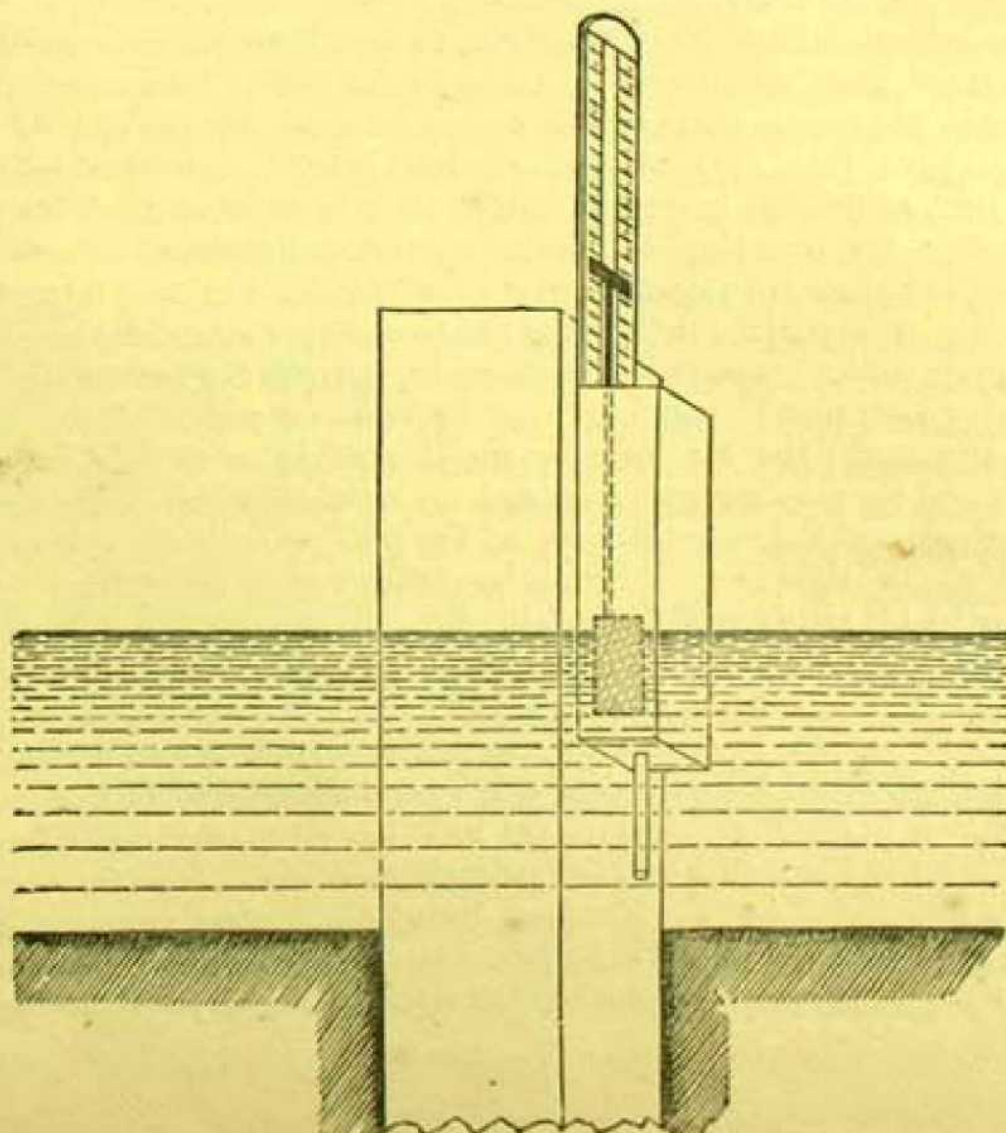
While engaged in completing the arrangements at Okha, Capt. Baird sent his assistants in advance to Hanstal and Nawanár to sink the wells, erect the observatories and get everything ready for him to set up the instruments.

The observatory at Okha was fixed on three cross-beams fitted on the tops of six large piles embedded 8 feet in the sand. The cylinder was about 2 feet from the eastern end; the tide-gauge being of course as nearly as possible in the centre of the building. The aneroid barometer was placed carefully on a shelf at one corner. The anemometer was fixed to a shelf so that the upright pipe passed through the roof close to the ridge at the western end (the rain-gauge being close to it on the outside). A platform was made to get at the anemometer easily, and this served a double purpose, as it was also the framework for a guard to protect the pendulum and clock of the tide-gauge, and cloth having been fixed all round it, kept any wind from getting to the pendulum.

The self-registering tide-gauge was carefully so placed that the band allowed the float to be 3 inches from one side of the cylinder, while it was the same distance itself from the other side. The instrument having been carefully levelled by wedges, the trestle was secured with screws to the floor; a hole was cut in the floor and a small box let down (properly fitted so as to allow no sand to come in), in order that the counterpoise weight might be able to act for the entire range of the instrument.

The float band was made 35 feet 6 inches long and 33 feet of chain was added to this, and fixed at its other end to the hook under the float, forming a continuous band as it were. The scale of wheels adopted here was $\frac{1}{4}$; the barrel being 5 feet long, that scale was the largest that could be used for a 14.90 feet range of tide. The float had a swivel to which the band was attached, and the band also passed through two guides fixed to an upright scale on one side, and through another guide fixed to the trestle on the other.

The temporary tide-gauge, consisting of a pile firmly imbedded in the sand and standing about 8 feet out of the ground, was placed about the



level of low-water neaps; to this was attached a box containing a copper float, and to the float was attached a deal rod with a pointer at the end of it about $6\frac{1}{2}$ feet above the float. In the bottom of the box a pipe, two feet long, of small diameter was fixed so as to permit the sea to have access to the float; the box itself was about 6 inches square and 6 feet high, the side of it attached to the pile was extended upwards for 6 feet and had a groove in it in which the upright rod with the index worked (*vide figure*), so that by having this upper part numbered from a certain zero, the level of the sea below this zero could be at once read off. It was found by careful trial in a bucket of water that the pointer always recorded 6 feet 2 inches above the level of the water in which the float worked—the scale was made accordingly; levels were taken to connect the temporary tide-gauge with the top of the cylinder, for comparison of level of water inside and outside.

It will be unnecessary to enter into details of the operations at each station as they were similar to those at Okha, of which the principal outlines have been given. Full details will be found in Capt. Baird's report appended to the General Reports of the Great Trigonometrical Survey for 1873-74 and 1874-75.

Commencement and Progress of the Observations.—The regular tidal registrations were commenced at Okha by the end of December 1873; at Hanstal by the end of March 1874, and at Nawanár by the end of April. It was hoped that they might have been carried on continuously for at least a year, or perhaps longer, at each station, in order to furnish the requisite data for investigations of the separate influence of each as well as the combined of all the principal tidal constituents, and the least that is needed for this purpose is a series of observations extending over a year. During this time the errors of the clocks for driving the barrels of the self-registering instruments would have to be frequently determined and the clocks corrected; the instruments would also have to be examined and cleaned, and possibly repaired also, and the relations between the curves on the diagrams and their zero lines would have to be carefully re-determined from time to time; and all this would have to be done either by Capt. Baird or by his assistant Mr. Rendell.

Capt. Baird accordingly drew up a programme for the periodic inspection of the stations and arranged that he and Mr. Rendell should make tours of inspection in turn. It was calculated that a tour embracing all three stations, would take about a month from the date of leaving to that of returning to recess quarters; these had been established in Rajkote, the nearest town to the Gulf where house accommodation suitable for Europeans could be obtained. Anticipating that during the monsoon months the weather at the tidal stations might be found too cloudy to permit of astronomical observations for determining the clock errors, Capt. Baird provided

himself with two portable chronometers which were rated at Rajkote and carried about on the tours of inspection, for comparison with the clocks.

Difficulties of the Operations.—The operations were carried on under many and great difficulties, and Capt. Baird and his assistants incurred considerable risk when crossing the Gulf in native sailing vessels, as they frequently had to, whenever their presence was required at either of the stations. Huts had to be built and iron water-tanks provided at each station for the native subordinates who were placed in charge of the instruments, and for the men of the guard furnished by the Durbar of the Native State in which the station is situated. Arrangements also had to be made to supply these men with food and drinking water, which at Hanstal was no easy matter, for the nearest point whence these necessities of life were procurable was about 25 miles off. At each station a line of post runners had to be established to the nearest points on the main line of postal communication, as it was essentially necessary that Capt. Baird should receive daily reports from the men in charge of the observatories.

The inspection of the observations necessitated a great deal of hard marching and entailed much exposure and privation. Even so early as in the month of May, before the setting in of the monsoon, the Runn of Cutch was covered with water, from six inches to a foot in depth, which had to be waded through for many miles distance to reach the station at Hanstal. At such seasons travellers usually cross the Runn by riding on the camels of the country; these animals are bred in large numbers along the borders of the Gulf, and are accustomed from their birth to wander about the swamps, browsing on the mangrove bushes, and thus they learn to walk with ease and keep their feet on ground which would be impossible to most other camels. Of his journey with Mr. Rendell, to Hanstal in the month of May, Capt. Baird writes, "Our only land-marks in the whole of the last 14 miles were two small mounds of earth thrown up—when there were postal chowkies there—at 4 or 5 miles apart, and the observatory itself; we both felt a curious sensation as if we were being carried out to sea, which was occasioned by seeing small branches of scrub floating on the surface of the water and being driven by the wind inland; and once, with the exception of one of the mounds above mentioned in the distance, there were no fixed objects visible to destroy this optical illusion." Later on, when the monsoon set in, the difficulties of locomotion were greatly increased; direct communication with Nawanâr, by crossing the Gulf in a sailing boat, became impossible, as none but native vessels were available for the purpose, and they could not venture across in the strong gales then prevailing; and in order to reach that station a very long circuit had to be made round the head of the Gulf, crossing the Runn at

its narrowest point opposite to Wawania. Moreover the common unmetalled roads in a black-soil country, as is the western portion of Kattywar, become all but impassible during the rains; and thus Capt. Baird was often unable to get over the ground more expeditiously than at the rate of about a mile an hour. Between the 7th July and the 8th September he was actually 38 days in the field, and marched nearly 800 miles under most adverse circumstances.

General Working of the Tide-gauges.—The general working of the tide-gauges at the three stations has now to be noticed.

At Okha the registrations went on most satisfactorily throughout 1874 and the following field season; there were very few breaks of continuity of the records, and they were very short and of no importance. At Hanstal where the water was very muddy, and not pure and clear as at Okha, the breaks were more numerous and longer; they were caused sometimes by the driving-clock getting out of order, but more frequently by the deposit of fine mud in the well and piping of the gauge, notwithstanding the precaution which had been taken to keep the rose at the extremity of the piping high above the mud-banks; this necessitated the occasional suspension of operations while the mud was being removed, and care was always taken to make the break between the times of high and low water, whenever possible; thus, as the record of the highest and lowest points of curves has been secured in almost all instances, the breaks may usually be interpolated between them by hand, in conformity with the collateral curves, without any risk of significant error. The foreshore at Okha being sand and rock without mud, there was no tendency there for the pipe to become choked. Both at Okha and at Hanstal air was found to enter the iron piping, whenever the latter was laid bare by the action of the surf, which frequently happened; but it was readily expelled at high-water, by opening the stop-cock which has already been described as attached to the piping for that purpose.

At Nawánár, matters went on less prosperously. When inspecting this station in July 1874, Capt. Baird found everything apparently in good order; the curves on the diagram seemed at first to be all that could be desired, but it was soon evident that they were erroneous, for the level of the water in the well differed very sensibly from the sea level. On examining the piping, the extreme end was found to be buried in sand above the low-water line, at a spot where a few weeks before, there had been a depth of 20 feet of water at low tide, but which was then left bare for some time daily. On further examination it was ascertained that the configuration of the foreshore had entirely changed, and an extensive sandspit had formed on the line of the piping; this had been caused by the drift from a belt of sand-hills to the south, under the influence of the strong winds which blew from the south-west during the monsoon, the registered veloci-

ties of which were 860 to 890 miles daily, for several days preceding the misadventure. This accident necessitated the suspension of the registrations at Nawanár until such time as the piping could be extracted and again put into communication with deep water. It was expected that the original configuration of the foreshore would probably be restored by natural causes, when the wind veered round to the usual direction, soon after the commencement of the cold-weather months; but this expectation was disappointed, and as the cold season wore on it became only too certain that the piping which lay beyond the low-water line would never be recovered. A supply of new piping was therefore obtained from Bombay and attached by Mr. Rendell to the land portion of the original pipe; and by the commencement of March 1875, after a break of 9 months' duration, the tide-gauge was once more in free communication with the sea, and there appeared to be every probability that it would so remain at least till the setting in of the next monsoon.

But within a fortnight after the re-starting of the tide-gauge at Nawanár, the foreshore again shallowed, and the new piping was covered with a deposit of silt and mud, nearly up to the level of the rose at its outer extremity. Mr. Rendell at once cut away the flexible piping and substituted several lengths of iron piping, supported by being attached to stakes driven vertically into the ground. By remaining on the spot for two months, taking measures to prevent the rose from being reached by the constantly rising mud and silt, Mr. Rendell succeeded in securing satisfactory and continuous readings for the whole of the time, and he checked them occasionally by hourly readings taken *pari passu* on a graduated staff, which had been set up in the sea in deep water, in order to afford a means of verifying the indications of the self-registering gauge. The station of Nawanár has thus been proved to be unsuitable for continuous tidal observations, extending over a long period, for it is only during the months of fine weather between November and May, that observations can be carried on there, otherwise than by setting up the tide-gauge on a staging erected for it out in deep water, the cost of which would be inadmissible.

Preliminary Results.—The preliminary results of the observations up to September 1874, as worked out by Capt. Baird, show that the greatest range of the tide was—

14·8 feet at	Okha.
19·6 „	Nawanár.
21·2 „	Hanstal.

or two to four feet more in each instance than the ranges given in the marine Charts.

Very fairly approximate values of the progress of the tidal wave, up and down the Gulf, have also been obtained, showing that—

High-water occurs at Nawánár 1*h.* 5*m.* after Okha.

"	Hanstal 1	40	"
Low-water occurs at Nawánár 1	36	"	
"	Hanstal 2	53	"

The results obtained from the combined tidal and leveling operations show that the mean sea-level is higher by 7 inches, at the head of the Gulf, and by 4 inches, midway up, than it is at the mouth of the Gulf.

The curves of the self-registering aneroid barometers were compared four times daily with a mercurial barometer, and the differences met with—after allowing for index errors—were usually so trivial and unimportant that every confidence may be felt in the general accuracy of the curves. The aneroids are of a delicate construction and are liable to get out of order, but as spare ones were available, no break of importance occurred at either station.

The anemometers were less satisfactory in their working, probably because they were so much more exposed to the vicissitudes of the weather. The long continuance of winds coming from the same quarter caused the direction gear to clog, and until this was discovered the recorded directions are to some extent incorrect. On the other hand, the velocity gear was kept in constant action by the strong winds prevailing. Several severe gales were recorded. The greatest velocities registered in 24 hours were—

620 miles at Okha on the 20th June, 1874.

890 " Nawánár " 26th "

1130 " Hanstal " 5th August, "

On the latter date the anemometer of Hanstal recorded 270 miles in the three hours between 2 A. M. and noon. Capt. Baird is not entirely satisfied with the performances of these instruments; but, considering their small size (for the sake of lightness and portability), and their exposure to fierce winds, to rain and, worse than all, to the constant oxidising influence of the sea, Colonel Walker thinks it improbable that any instruments would, under similar circumstances, have given much better results.

The total rainfall during the monsoon of 1874, as registered by the rain-gauges set up at each station, was—

10·75 inches at	Okha.
13·61	" Nawánár.
18·40	" Hanstal.
21·91	" Rajkot (40 miles inland).

It will be seen that, a greater range of tide, a greater velocity of wind and a greater rainfall, have been registered at the head than at the mouth of the Gulf, and intermediate values at the midway station of Nawánár.

The scientific value of the observations is greatly increased by the contemporaneous observations of the barometric pressure, the velocity and direc-

tion of the wind, and the amount of rainfall; and it is believed that no series of tidal observations has been better furnished than these with the requisite data for separating local atmospheric influences from the true tidal constituents, which are caused by the varying position of the sun and moon.

Spirit-leveling operations.—At short distances round each station three blocks of stone were sunk in the ground to serve as bench-marks for future reference, and each of them was carefully connected with the zero of the tide-gauge. Bench-marks were also placed in position, one at about every 10 miles, from Okha station along the road to Hanstal and thence to Nawanár in Kutch across the Runn. Bench-marks were also laid down with reference to the nearest Great Trigonometrical Stations. During the field-season of 1874-75, Capt. Baird conducted a series of spirit-leveling operations for determining the present relative levels of the datum points of the three tidal stations, and of the stone bench-marks which had been laid down a year previously along the lines to be levelled over. The length of the main lines connecting the three tidal stations was 275 miles, which was leveled over independently by Capt. Baird and Narsing Dass, in accordance with the rigorous system which has obtained for several years past in the G. T. Survey. 29 miles of branch lines were also executed, in order to connect the stations of the Kattywar triangulation with the tidal stations.

In working between Nawanár and Hanstal, Capt. Baird had to make a considerable *detour* round the head of the Gulf, crossing the Runn between Shikarpur and Mallia. Several bench-marks were fixed on the Runn, and they will be important points of reference when these operations are repeated with the tidal observations some years hence, when a sufficient interval shall have elapsed to allow of the rising or sinking of the surface of the ground to an appreciable extent. The existing surface-level of the Runn has been obtained at a number of points, for Capt. Baird took the precaution of having all the pins on which the leveling staves were set up, driven downwards until their heads were exactly flush with the surface of the ground.

Operations during the Monsoon.—Considerable anxiety was felt as to the possibility of securing continuous records during the monsoon, when heavy gales are prevalent; but every precaution was taken to strengthen the wooden observatories in which the instruments were set up, and to anticipate and provide for all possible contingencies; and it was most satisfactory that, although the monsoon of 1874 set in very severely and lasted long, the observatories all stood firm, and the tide-gauges and other self-registering instruments remained in good working order throughout the season.

Close of the Operations.—The carrying out of the periodical inspections during the monsoon was the most trying and difficult part of the operations.

During the monsoon of 1874 this duty was performed entirely by Capt. Baird, who had generously given his assistant leave of absence on urgent private affairs at that time. It had, however, proved to be so arduous and to entail so much exertion and exposure, that Colonel Walker felt he would not be justified in requesting Capt. Baird to carry on the inspections during the monsoon of 1875. He was therefore directed to continue the registrations up to within a few days of the commencement of the monsoon, and then to dismantle all the stations, and remove the instruments.

Accordingly at the close of the field-season of 1874-75, the instruments were taken down and the observatories dismantled. At each station the vertical iron cylinder, in which the float of the guage had acted, was left *in statu quo*, together with a length of the iron piping, extending about 50 feet seawards from the cylinder. The cylinder was filled with clean dry sand, and closed above with a thick planking, after which a massive pile of stones was raised over the ground around it, to serve the double object of a protection and an indication of the position for future reference.

The three bench-marks in the immediate vicinity of the cylinder, with each end of which the datum of the guage had been connected, were similarly covered over. Finally the several cairns were placed under the protection of the local officials; and it is to be hoped that the cylinders and bench-marks will be readily discovered whenever the second series of operations are commenced, and that they will be found to have remained undisturbed meanwhile.

Thus the periods during which the tidal heights have been continuously registered at the three stations are, $16\frac{1}{2}$ months at Okha, 14 months at Hanstal, 2 months at Nawánár in 1874 and 2 months more in 1875. As already noticed, simultaneous observations of the direction and velocity of the wind and of the barometric pressure were made by the anemograph and barograph which were set up at each station.

The long break in the registrations at Nawánár is to be regretted. But as the station lies nearly midway up the Gulf, it is probable that the values of the difference between the mean level for the periods of actual observation and the mean level for the entire year, which are given by the registrations at Okha and Hanstal, may be applied proportionately to the results at Nawánár, to obtain the mean level for the year there, and Capt. Baird found that this plan gave very accordant and promising results.

When all the observations were completed, the ordinates of the several curves were measured, (taking full account of clock-error whenever there was any) and then tabulated for each hour of the day. The numerical results thus obtained serve as the data on which the analysis of the observations was subsequently based.

Thus ended the first series of operations, to determine whether the relations of land and sea are constant or changing. Col. Walker writes :

"Great credit is due to Capt. Baird for the manner in which he conducted the task entrusted to him. The difficulties he had to contend with in obtaining exact registrations continuously for such long periods were very serious and formidable; all the stations were situated at points on the coast line which were very far from the nearest habited localities; and the inspections during the season of monsoons, which work was done entirely by himself, necessitated constant travelling during the most inclement time of the year, and entailed an amount of risk and exposure which would tell on a constitution of iron."

Final Results.—The analysis of the results of the observations has necessarily been a work of time and has only lately been completed. Col. Walker felt assured that it would be best performed with the assistance of Mr. Roberts of the Nautical Almanac Office in London, by whom all the tidal observations taken for the British Association had been, and are still being reduced and analyzed, under the superintendence of Sir W. Thomson, and who had, previous to the commencement of the observations, aided Capt. Baird in the preparation of an account of the practical application of the harmonic analysis by which tidal observations are reduced for the British Association. Sanction was therefore obtained for Capt. Baird to remain in England and reduce his observations with Mr. Roberts' assistance. The results will be presently stated. But first it is necessary to give a brief epitome of the method of investigation which has been followed.

The rise and fall of the level of the ocean, twice, or nearly so, in twenty-four hours, is well known to be due to the attractions of the sun and the moon. If the orbit of the earth and that of the moon were quite circular and lay in the plane of the equator, and if the moon performed its revolution round the earth in the same time that the sun appears to revolve around the earth, then there would be two tides daily, differing from each other in form—should the sun and moon not be in conjunction—but recurring alike from day to day. The moon, however, makes her circuit of the earth in 48 minutes over the twenty-four hours, and thus the sun makes thirty apparent circuits of the earth while the moon is only making twenty-nine; moreover, the orbits of the earth and of the moon are not circular, nor are they situated in the plane of the equator. Thus the positions of the sun and moon, relatively to the earth, are momentarily varying in distance, declination and right ascension. Consequently, the level of the ocean is subject to momentary variations in the dynamical action of the disturbing bodies; and these cause a variety of tides which recur periodically, some in short, others in long, periods.

In the present investigations, the short and the long period tides have been analyzed by different methods. The former—which here embrace all tides recurring in periods of or about a day in duration, and in any aliquot part of the *quasi*-diurnal period—have been treated in accordance with the

synthesis of Laplace. Thus a number of fictitious stars are assumed to move, each uniformly in the plane of the earth's equator, with angular velocities which are small in comparison with that of the earth's rotation, so that the period of each star is something not very different from 24 mean solar hours, and ranges between a minimum of 23 hours and a maximum of 27. Each star is supposed to produce a primary tide in its *quasi*-diurnal period, and also various sub-tides which run through their periods in $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ or some other aliquot part of the primary period; but of these sub-tides it may here be observed that some are considerably larger than their so-called primaries, as for instance, the lunar semidiurnal tide, the magnitude of which is enormously greater than that of the lunar diurnal. The primary is simply the tide of which the period is nearest to 24 mean solar hours.

Thus the momentarily varying level of the surface of the ocean is supposed to be the resultant of a large number of tides, each of which is perfectly independent of all the others, and has its own amplitude and period of revolution, which remain ever constant throughout all time. Occasionally several of the most important tides are in conjunction, and then the range between high and low-water is a maximum, as at spring tides; at other times some tides are in opposition to others, and then the tidal range is a minimum, as occurs at neap tides.

Every tide may be represented by a circle of known diameter; and if we suppose a point to move uniformly right round the circumference of this circle so as to make a complete revolution in the time which is the tide's period, then the height of the point above or below the horizontal diameter of the circle at any moment, represents the height of the tide at that moment.

By the synthesis of Laplace we are able to find, from continuous observations of the varying level of the sea, the amplitude and the epoch (as they are called) of each of the several tides of which the height of the sea-level at any moment is the resultant. The amplitude is the radius of the representative circle, the epoch enables us to ascertain the point which the tide has reached at any given moment during its movement over the circumference of the circle. Thus when we know the amplitudes, the epochs and the velocities of rotation of any number of constituent tides, we are in a position to be able to compute and predict the height of the sea-level, at any future moment, at the station where the observations on which our calculations are based were taken.

The velocity of rotation of a tide rests primarily on certain combinations of the angular velocities of the earth's rotation round its axis, the moon's rotation round the earth, the earth's round the sun, and the progression of the moon's perigee, which are decided on *a priori* from theoretical considerations. These preliminary angular velocities are the arguments of the several fictitious stars of Laplace's method.

The portion of the height of the sea-level above or below its mean height (with reference to some fixed datum line), which is due to the combined influences of the several tides produced by any one of the fictitious stars, is given by the following well-known expression of the law of periodicity:—

$$h = R_1 \cos(nt - \epsilon_1) + R_2 \cos(2nt - \epsilon_2) + R_3 \cos(3nt - \epsilon_3) + \dots$$

in which h is the height above mean sea at any moment, t is the time expressed in mean solar hours, commencing at 0^h , astronomical reckoning, and n is the angular velocity of the star in degrees of arc per mean solar hour, so that $360^\circ \div n$ denotes the period of the star in hours of mean time. R_1 is the amplitude, and ϵ_1 the epoch of the full-period tide; R_2 and ϵ_2 , R_3 and ϵ_3 , &c., are the amplitudes and epochs of the sub-tides, whose periods are one-half, one-third, &c., that of the primary period. The amplitude is the semi-diameter of the circle whose circumference indicates the path of a tide. The epoch is the arc which, when divided by the angular velocity of the tide, gives the hour-angle when the height of the tide is a maximum; this occurs, on the day of starting, when $nt = \epsilon_1$ for a primary tide, when $2nt = \epsilon_2$ (and again 12 *quasi*-hours afterwards) for a tide whose period is half that of the primary, and so on.

Thus, if we now put h for the height of the sea-level at any moment, and A for the value of the height of the mean sea-level which results from the combined influence of the whole of the fictitious stars, we have—

$$h = A + \Sigma \left\{ R_1 \cos(nt - \epsilon_1) + R_2 \cos(2nt - \epsilon_2) + \dots \right\}$$

where the symbol Σ stands for the summation of the whole of the terms within the brackets, which relate to all the fictitious stars.

There are two principal stars, respectively called S and M for brevity, the first of which represents the mean sun, or that point in the plane of the earth's equator whose hour-angle is equal to mean solar time; the second represents the mean moon, a point moving in the plane of the equator with an angular velocity equal to the mean angular velocity of the moon. The other fictitious stars respectively furnish the corrections to S and M for declination and parallax, to M for lunar evection and variation, and to S and M for the compound actions which produce what are called Helmholtz Tides, &c. The 24th part of the period of star S being an hour, that of any other of the fictitious stars may be conveniently spoken of, and is here called a *quasi*-hour.

To find the argument (the angular velocity n of the preceding formulæ) for each fictitious star, various combinations have to be made of the following fundamental angular velocities, *viz.* :—

γ , the earth's rotation.....	=	15°·0410686	per mean solar hour.
σ , the moon's revolution round the earth..	=	0·5490165	" "
μ , the earth's revolution round the sun....	=	0·0410686	" "
ω , the progression of the moon's perigee ..	=	0·0046418	" "

The several fictitious stars whose tides have been analyzed in these investigations, are—

S,	with argument $n = \gamma - \eta$	$= 15^\circ$.
M	" $\gamma - \sigma$	$= 14.4920521$
K	" γ	$= 15.0410686$
O	" $\gamma - 2\sigma$	$= 13.9430356$
P	" $\gamma - 2\eta$	$= 14.9589314$
J	" $\gamma + \sigma - \hat{\omega}$	$= 15.5854433$
Q	" $\gamma - 3\sigma + \hat{\omega}$	$= 13.3986609$
μ	" $\gamma - 2\sigma + \eta$	$= 13.9841042$
N	" $\gamma - \frac{3}{2}\sigma + \frac{1}{2}\hat{\omega}$	$= 14.2198648$
L	" $\gamma - \frac{1}{2}\sigma - \frac{1}{2}\hat{\omega}$	$= 14.7642394$
ν	" $\gamma - \frac{3}{2}\sigma - \frac{1}{2}\hat{\omega} + \eta$	$= 14.2562915$
λ	" $\gamma - \frac{1}{2}\sigma + \frac{1}{2}\hat{\omega} - \eta$	$= 14.7278127$
MS	" $\gamma - \frac{1}{2}\sigma - \frac{1}{2}\eta$	$= 14.7460261$
and SM	" $\gamma + \sigma - 2\eta$	$= 15.5079479$

The *quasi*-hour angles of the several fictitious stars, other than S, at mean noon of the day of starting, were found by putting

$$\begin{aligned}\gamma &= \text{the Sidereal time,} \\ \eta &= \text{the Sun's mean longitude} = \gamma, \\ \sigma &= \text{the Moon's mean longitude,} \\ \sigma - \hat{\omega} &= \text{the Moon's mean anomaly,}\end{aligned}$$

and taking the corresponding numerical values of each element, for the hour and station, from the Nautical Almanac and Hansen's Lunar Tables, and then substituting these values in the preceding symbolic expressions for the hourly variations of the several stars.

The number of stars and the angular velocity of each star having thus been decided on, *a priori*, from theoretical considerations, the values of the constants R and ϵ for the tidal constituents of each star have to be determined from the evidence afforded by the tabulated values of the height of the sea-level for every hour of the day during the entire period of observation; this should not be less than 371 days. The values of the constants have been computed for the several tides at the three stations of Okha, Nawánár, and Hanstal, and are given below. It will be remembered that Okha is situated at the entrance to the Gulf of Cutch, Nawánár midway up the Gulf, and Hanstal at its upper extremity; also that continuous observations over a period of not less than 14 months were obtained at the upper and lower stations, whereas at the middle station, Nawánár, there was a break of several months, in consequence of an alteration of the fore-shore during the monsoon of 1874; thus the results for Nawánár are far from being as exact and complete as those for the two other stations.

Table of the Constants.

	OKHA.	NAWANÁR.	HANSTAL.
	Feet.	Feet.	Feet.
	°	°	°
The star S	$R_1 = 0.0741, \epsilon_1 = 149.89$	Wanting.	$R_1 = 0.1292, \epsilon_1 = 164.01$
	$R_2 = 1.2224, \epsilon_2 = 14.37$		$R_2 = 1.9277, \epsilon_2 = 84.51$
	$R_3 = 0.0132, \epsilon_3 = 116.57$		$R_3 = 0.0211, \epsilon_3 = 61.74$
	$R_4 = 0.0030, \epsilon_4 = 20.92$		$R_4 = 0.0069, \epsilon_4 = 166.57$
	$R_5 = 0.0006, \epsilon_5 = 219.81$	Ditto.	$R_5 = 0.0025, \epsilon_5 = 158.63$
	$R_6 = 0.1122, \epsilon_6 = 120.86$		$R_6 = 0.1208, \epsilon_6 = 155.61$
	$R_7 = 3.6936, \epsilon_7 = 348.08$	Wanting.	$R_7 = 6.6291, \epsilon_7 = 46.52$
	$R_8 = 0.0289, \epsilon_8 = 22.10$		$R_8 = 0.0534, \epsilon_8 = 93.55$
The star M	$R_1 = 0.1265, \epsilon_1 = 108.88$	Wanting.	$R_1 = 0.06803, \epsilon_1 = 331.55$
	$R_2 = 0.0056, \epsilon_2 = 272.57$		$R_2 = 0.2760, \epsilon_2 = 248.94$
	$R_3 = 0.0102, \epsilon_3 = 100.06$	Ditto.	$R_3 = 0.0726, \epsilon_3 = 154.36$
	$R_4 = 1.5605, \epsilon_4 = 146.60$		$R_4 = 1.6502, \epsilon_4 = 174.60$
	$R_5 = 0.4207, \epsilon_5 = 24.82$	Wanting.	$R_5 = 0.6767, \epsilon_5 = 88.63$
	$R_6 = 0.8095, \epsilon_6 = 322.67$		$R_6 = 0.8807, \epsilon_6 = 340.76$
	$R_7 = 0.3844, \epsilon_7 = 319.94$	Wanting.	$R_7 = 0.3839, \epsilon_7 = 353.65$
	$R_8 = 0.1231, \epsilon_8 = 176.32$		$R_8 = 0.1091, \epsilon_8 = 222.61$
The star K	$R_1 = 0.1596, \epsilon_1 = 324.68$	Wanting.	$R_1 = 0.1618, \epsilon_1 = 343.23$
	$R_2 = 0.1511, \epsilon_2 = 224.77$		$R_2 = 0.3892, \epsilon_2 = 238.32$
	$R_3 = 0.7551, \epsilon_3 = 322.94$	Ditto.	$R_3 = 1.1535, \epsilon_3 = 26.76$
	$R_4 = 0.0712, \epsilon_4 = 204.40$		$R_4 = 0.2268, \epsilon_4 = 219.57$
	$R_5 = 0.1592, \epsilon_5 = 8.50$	Wanting.	$R_5 = 0.2864, \epsilon_5 = 48.24$
	$R_6 = 0.1896, \epsilon_6 = 184.26$		$R_6 = 0.5569, \epsilon_6 = 179.74$
	$R_7 = 0.0435, \epsilon_7 = 291.24$	Ditto.	$R_7 = 0.1309, \epsilon_7 = 297.74$
	$R_8 = 0.0619, \epsilon_8 = 112.37$		$R_8 = 0.3388, \epsilon_8 = 13.01$

It will be seen that the principal tides are first the *quasi*-semi-diurnal of M, and then the semi-diurnal of S and the *quasi*-diurnal of K, which range from one-third to one-fourth of the former. S and M being the principal stars, their sub-tides, down to the three-hourly tide of S and the corresponding tide of M, have been computed. For K the *quasi*-diurnal and semi-diurnal tides were computed; for the stars O to Q only the primary tides. For the stars L to SM there are no primaries, and the tides of longest period are the *quasi*-semi-diurnal; for MS the longest tide is the *quasi*-demi-semi-diurnal; these, being the principal ones for each star, have been computed.

Here it is necessary to observe that the number of sub-tides which have to be investigated in each instance, in order to evaluate the full influence of the star, is a matter which can only be decided after considerable experience of such investigations has been gained by the analysis of the tides at a great variety of stations. It was therefore left to Mr. Roberts, whose practical familiarity with the subject probably exceeds that of any other individual, to prescribe the number of terms to be computed for each star.

On inserting the numerical values of the constants R and ϵ in the general expression, and substituting for nt its values in succession for every hour from the starting-point, the height (in feet) of each tide and sub-tide may be computed for every hour. The sum of these gives the portion of the height of the sea-level at that hour which is due to the influence of the short-period tides. This usually far exceeds the portion which is due to all other causes, and is thus frequently taken to represent the whole height.

Should it be desired to compute the hourly heights for any day of any year, without commencing at the starting-point of the observations, as may be necessary when tidal predictions are required, the values of γ , η , σ , and ω must be found, as stated on page 46, for mean noon of the day which may be adopted as the new starting-point; the *quasi*-hour-angles of the several fictitious stars, other than S, at that moment must then be found, after which those for the succeeding hours may be obtained by successive additions of the respective hourly increments which are due to each star.

The values of the constants R and ϵ having been determined for each of the three tidal stations, the next step taken was the calculation of the height of the sea-level at each hour, throughout the entire period of registration at each station. The differences between the observed and the computed values were then taken as the data for calculating the influence of variations in barometric pressure, and in the velocity and direction of the wind, on the sea-level. Equations were formed in which the unknown quantities were B , the effect of a barometric pressure of one inch, and N and E , the effects of the North and the East components respectively of winds blowing at the rate of 10 miles an hour. Of these equations there were as many as the number of days of observation; they were solved by the method

of minimum squares. Corrections were then computed for the daily variations of the atmospheric influences on the sea-level, and were applied to the values of height resulting from the previous investigations of the short-period tides. Finally, the differences between the heights thus determined and those actually observed were taken as the data for calculating the influence of each of the long-period tides.

The evaluation of the atmospheric influences gave the following factors for changes of sea-level due to a barometric pressure of one inch, and to north and east winds travelling with a velocity of 10 miles per hour :—

			At Okha.	At Hanstal.
Barometric pressure	...	...	+ 0.356 feet	— 0.438 feet.
North Wind	...	...	— 0.191 "	— 0.262 "
East Wind	...	...	+ 0.161 "	+ 0.087 "

These results are not satisfactory; the height of the sea-level at Okha appears to increase with an increase of barometric pressure, which is scarcely possible. It happens that at this station the changes of pressure occurred, as a rule, simultaneously with the changes of wind; and thus it is impossible to determine the separate effect of each, otherwise than by some arbitrary method of treatment. The observations will therefore be again analyzed, with a view to ascertaining whether they may not be made to yield more consistent results. Meanwhile, the values of the atmospheric factors already obtained must be considered to be only approximate, giving fairly accurate results when employed collectively but not individually.

Of the constants for the long-period tides the following values have been computed for the stations of Okha and Hanstal, after the elimination of atmospheric influences, by employing the preliminary values of the factors which are given in the preceding paragraph. At Nawánár sufficient observations are not forthcoming for the evaluation of either the atmospheric or the long-period tides.

Long-period tides, and their Constants.

- ($\sigma - \hat{\omega}$) Lunar monthly elliptic tide,
 2σ Lunar fortnightly declinational tide,
 $2 (\sigma - \eta)$ Luni-solar synodic fortnightly tide,
 η Solar annual elliptic tide,
 2η Solar semi-annual declinational tide,

OKHA.			HANSTAL.		
Feet.	°	Tide.	Feet.	°	
$R = 0.058, \epsilon = 311.38$		($\sigma - \hat{\omega}$)	$R = 0.107, \epsilon = 14.17$		
" 0.070, "	52.73	2σ	" 0.142, "	45.74	
" 0.136, "	249.19	$2 (\sigma - \eta)$	" 0.163, "	11.76	
" 0.162, "	3.11	η	" 0.024, "	195.32	
" 0.121, "	144.75	2η	" 0.090, "	156.38	

The present appears to be a good opportunity for giving the tidal constituents which were calculated by Mr. Roberts for the Port of Tuticorin, from observations taken there in the year 1871-72, by Captain Branfill, with a self-registering tide-gauge similar to those employed in the Gulf of Cutch.

Short-period Tides at Tuticorin, and their Constants.

	Feet.		Feet.
Star S ...	$R_1=0.039, \epsilon_1=108.78$	Star P ...	$R_1=0.064, \epsilon_1=281.78$
	$R_2=0.429, \epsilon_2=95.59$	" J ...	$R_1=0.011, \epsilon_1=181.70$
	$R_3=0.073, \epsilon_3=282.65$	" K ...	$R_1=0.274, \epsilon_1=132.80$
	$R_6=0.003, \epsilon_6=51.34$	" Q ...	$R_1=0.143, \epsilon_1=116.25$
	$R_8=0.007, \epsilon_8=262.75$	" L ...	$R_1=0.032, \epsilon_1=359.08$
Star M ...	$R_1=0.006, \epsilon_1=234.64$	" N ...	$R_2=0.030, \epsilon_2=242.50$
	$R_2=0.596, \epsilon_2=55.81$	" λ ...	$R_2=0.072, \epsilon_2=38.69$
	$R_3=0.015, \epsilon_3=182.86$	" ν ...	$R_2=0.019, \epsilon_2=248.45$
	$R_4=0.022, \epsilon_4=192.76$	" μ ...	$R_2=0.022, \epsilon_2=35.58$
	$R_6=0.010, \epsilon_6=45.91$	" 2SM ...	$R_2=0.016, \epsilon_2=183.83$
	$R_8=0.004, \epsilon_8=319.74$	" MS ...	$R_2=0.011, \epsilon_2=246.37$
Star O ...	$R_1=0.112, \epsilon_1=314.25$		$R_4=0.018, \epsilon_4=282.99$

Long-period Tides at Tuticorin, and their Constants.

	Feet
Lunar monthly ...	$R=0.024, \epsilon=313.15$
Lunar fortnightly ...	$0.065, 69.54$
Luni-solar fortnightly ...	$0.016, 307.85$
Solar annual ...	$0.399, 313.35$
Solar semi-annual ...	$0.080, 87.50$

Here there were no data for evaluating the atmospheric tides separately, and it is probable that the magnitude of the amplitude of the solar annual tide is in great measure due to atmospheric influences.

PROGRAMME OF FUTURE OPERATIONS.

The following important orders on the systematic record of tidal observations at selected points on the Coasts of India, were issued by the Government of India in the Department of Revenue, Agriculture, and Commerce, under date 4th July, 1877 :—

" The Governor General in Council observes that the great scientific advantages of a systematic record of tidal observations on Indian coasts have frequently been urged upon, and admitted by, the Government of India. Hitherto the efforts in the direction of such a record have been desultory, and in many cases wanting in intelligent guidance and careful selection of the points where the observations should be recorded. Additional importance has recently been given to the subject by the institution of a Marine Survey Department, for whose operations accurate tidal observations are a

necessity, without which no permanent record of the changes of ground in the different harbours of the coast can be kept up.

"2. The advantages to be expected from well-considered and carefully conducted observations of the tides are mainly the following :

"(1) They enable standards to be fixed for the purposes of survey.

"(2) They afford data for the calculation of the rise and fall of the tides, and thus subserve the purposes of navigation.

"(3) They are of scientific interest apart from their practical usefulness as stated above.

"The first two of these advantages are of strictly local bearing : an accurate survey of a port is essential to the safety of the shipping frequenting it, and correct tide-tables are necessary for the convenience of navigators and for engineering purposes within the port itself.

"3. The Governor General in Council is of opinion that, in view of these considerations, every port where a tide-gauge is set up should pay for its establishment and maintenance from port funds. The third object, the scientific results to be expected from the record, will be sufficiently provided for by the appointment by the Government of India of one of its own officers to supervise and control the local observations, and to arrange for their utilization to the utmost extent possible. The charges will thus be divided in a manner appropriate to the advantages to be secured.

"4. His Excellency in Council accordingly resolves to entrust the general superintendence and control of tidal observations upon Indian coasts to Captain Baird, R. E., Deputy Superintendent in the Great Trigonometrical Survey Department, who will be guided in his operations by the orders and advice of the head of that Department. This will involve no new charge upon Imperial Funds, for Captain Baird has for some years past been engaged upon observations of this nature in the Gulf of Cutch and in reduction of the observations in England : the work is of a nature which properly falls within the scope of the operations of the Great Trigonometrical Survey ; and the object of the present change is merely to provide for its extension and systematization under an undivided control. Captain Baird will thus remain a member of the Department, and his operations will form one of the subjects to be treated by the Superintendent in his annual report.

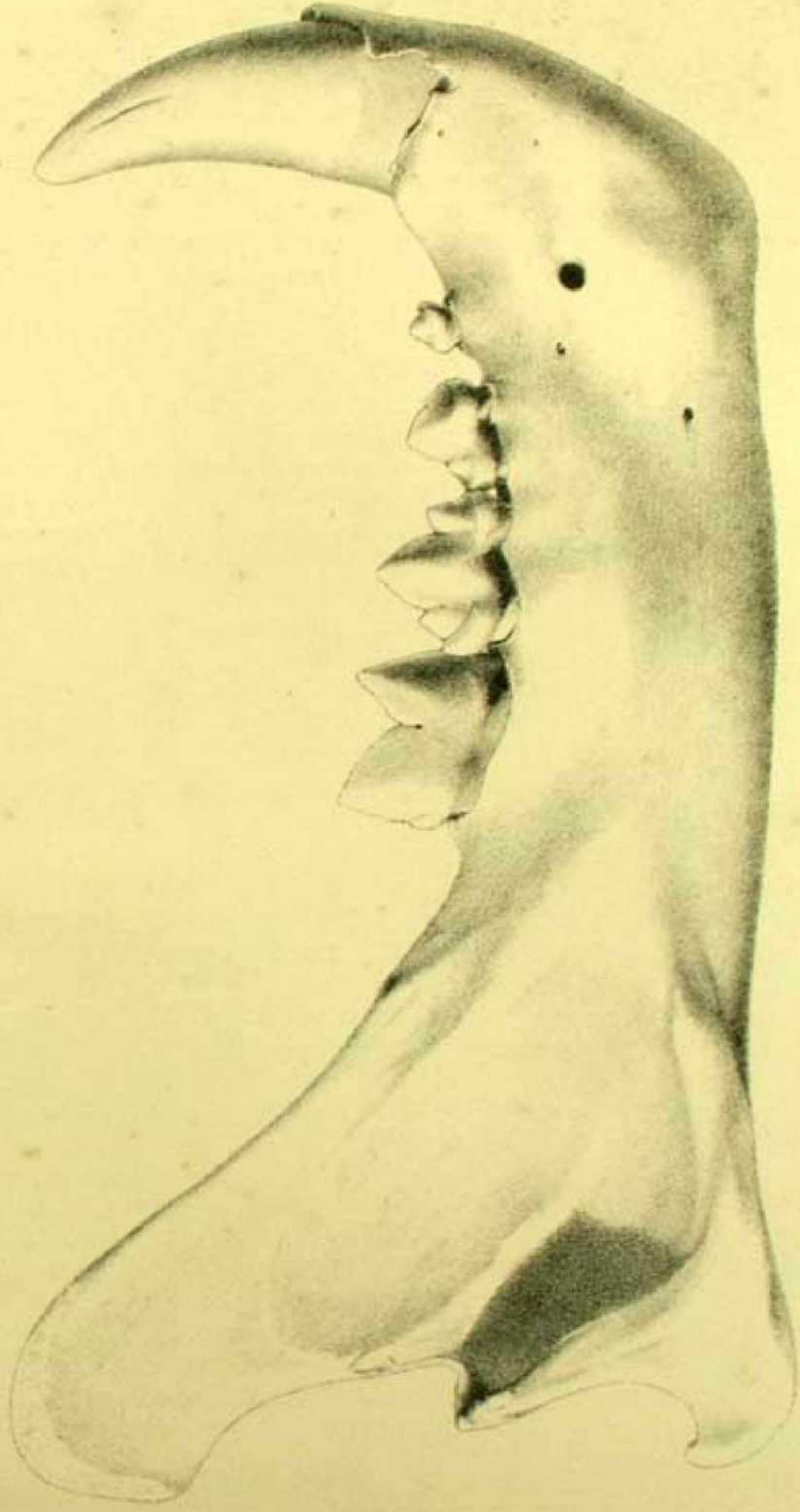
"5. The first duty of the Superintendent will be to instruct Captain Baird to determine, in communication with the Governments of the maritime provinces, the points where observations should be carried out. The necessary gauges (where these do not already exist) will then have to be provided from port funds, and the establishments entertained under the sanction of the Local Governments. It will probably be most convenient that all Captain Baird's communications with the establishments in charge

should pass through the Local Governments, but this point may be settled as may be found most expedient in practice."

In accordance with these orders, enquiries have been, and are being made, with a view to ascertain the ports at which it will be desirable to establish tidal stations. The suitability of a port for this purpose will depend, *first*, on a site being available thereat, on which a self-registering tide-gauge may be erected, so as to be either immediately over the sea, or connected by piping with the sea at some point where there is a depth of not less than 10 to 15 feet of water at the lowest tides; *secondly*, on the presence of a port officer, who will exercise a general supervision over the operations, and correct the clocks of the several self-registering instruments, whenever necessary, either by direct determinations of time, or by arranging to get the true time from the nearest telegraphic office; *thirdly*, on the feasibility of making arrangements for the periodical inspection of the instruments at intervals of not less than six months generally, and more frequently when no officer is resident on the spot to superintend the operations.

So far as has yet been ascertained, the ports which seem likely to answer all the required conditions are Aden, Kurrachee, Bombay, Carwar, Beypore, Paumben, Madras, Vizagapatam, Akyab, Rangoon, and Port Blair. The following ports are believed to be unsuitable: Surat, Mangalore, Cannanore, Cochin, Muttrun, Negapatam, Coconada, False Point, Diamond Harbour, Moulmein, and Mergui.

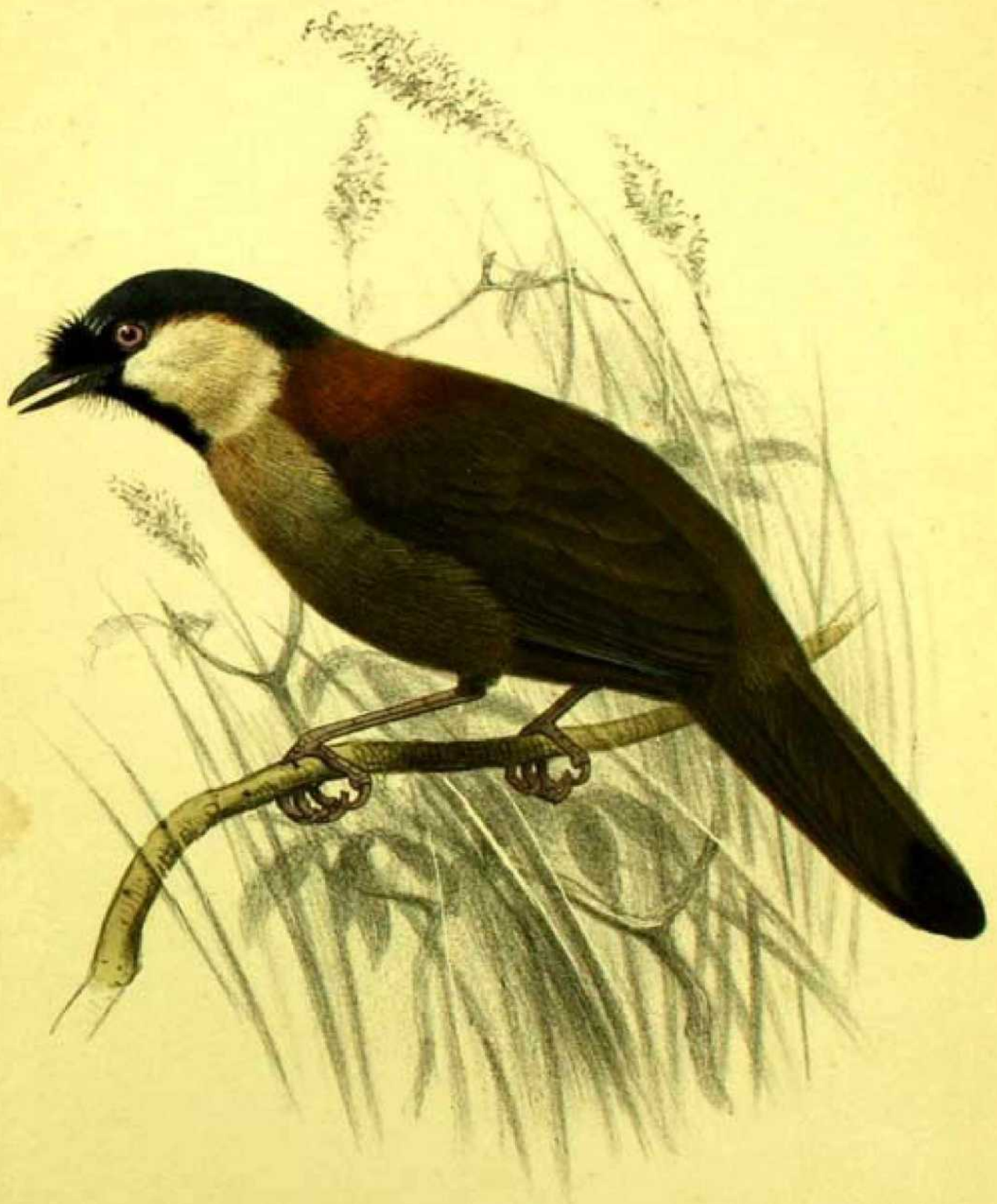
At Aden a self-registering tide-gauge was erected by the local officers about two years ago; but the registers have been taken in such an unsatisfactory manner that the results are not of the slightest use. Captain Baird is now arranging for the establishment of a tidal station there, with proper instruments, and trained men to take charge of them. At Kurrachee a tide-gauge, which was originally set up by Mr. Parkes, has been in work for several years, and has furnished the data from which tide-tables for the port have been computed annually by Mr. Parkes. In course of time the present gauge—the scale of which is very small—should be replaced by one of those which are used by Captain Baird, and an anemometer and a barometer (both self-registering) should be set up beside the gauge. But it is not desirable to interfere with the working of the present arrangements at Kurrachee until other ports, at which nothing is now being done in the way of tidal observations, are duly provided for. At Bombay, Carwar, and Madras, instruments are now being set up by Captain Baird.



ABNORMAL DENTITION OF TIGER.

Calcutta.

S. Sedgfield Lith.



J. Smit lith.

Hanhart imp.

GARRULAX NUCHALIS.



J. Smit lith.

Hanhart imp.

ACTINURA ÖGLEI.

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Part II.—PHYSICAL SCIENCE.

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VI.—*The Application of Photography to the Reproduction of Maps and Plans by Photo-mechanical and other processes.*—By CAPT. J. WATERHOUSE, B. S. C., *Assistant Surveyor-General of India.*

This paper was originally submitted to the Geographical Congress at Paris in 1875, but as the Proceedings of the Congress have not been published and the paper may be of interest to Members of the Society, as giving an account of the photographic operations for the reproduction of maps, now so largely employed in this country, I have carefully revised and to a great extent re-written it, so as to bring the information up to date and hope that it may not be considered too much wanting in novelty or too technical for the Journal.

I. INTRODUCTION.

Among the many useful and important artistic and scientific applications of photography, one of the most valuable is the reproduction by its means, in absolute facsimile, of maps and plans, speedily and cheaply and on any scale—either the same, larger, or smaller. So fully are these advantages appreciated, that most civilized States now possess special photographic studios for the reproduction of maps, plans, &c., for fiscal, military and other purposes.

Before the introduction of lithography, about the beginning of the present century, the only means by which maps, or indeed, pictorial subjects of any kind, could be reproduced, was by engraving on metal plates or on wood, both tedious and expensive methods.

With the invention of lithography, a new impetus was given to cartography by the comparative ease with which maps could be produced and multiplied by direct drawing or transfer on stone. The young art was, however, scarcely out of its cradle when Joseph Nicéphore Niepce, of Châlons-sur-Saône, experimenting unsuccessfully in endeavouring to find a substitute for lithographic stone, conceived the happy idea of obtaining images on metal plates by the sole agency of light upon thin films of asphaltum or bitumen of Judæa—and thus produced the first permanent photographs by a method of heliographic engraving, which, with a few modifications, still serves to produce excellent results; and it is worthy of remark in connection with our subject that Niepce's first essays were in reproducing engravings.

Since these first essays of Niepce, the idea of superseding the slow and laborious hand-work of the lithographic draftsman and engraver by the quicker, cheaper and more accurate processes of photography, has been steadily kept in view, and various modes of engraving, both for copper-plate and surface-printing, and of lithography by the aid of photography, as well as other special photo-mechanical processes, have been introduced from time to time with more or less success, till at the present time these methods have taken a high and important position among the graphic arts, and as they steadily progress towards perfection, are rapidly extending their artistic, scientific and industrial applications.

The attention of cartographers was very soon drawn to the advantages that might be gained by the employment of photography for the reproduction of maps and plans, but for some time progress in this direction was hindered by the difficulty of obtaining accurate images, free from the distortions caused by imperfect construction of the photographic lenses then employed. The first serious attempt to carry out the method practically appears to have been made, in 1855, by Colonel Sir Henry James, R. E., Director of the Ordnance Survey of Great Britain and Ireland, with the object of obtaining accurate reductions from the large-scale surveys more expeditiously and with more economy than could be done by means of the pantograph.

The result proved incontestably the great value of photography for this purpose and the enormous saving in time and money that could be effected by its use. The possibility of producing absolutely accurate photographic reductions was questioned in Parliament, but Sir Henry James satisfactorily showed that the employment of photography produced reductions more accurate than could be obtained by any method previously in use; that the maximum amount of error could scarcely be perceived, and was much within the limit of the expansion and contraction of paper under ordinary atmospheric changes—which was all that could be desired.

For some time, however, the use of photography in the Ordnance Survey Office appears to have been limited to obtaining accurate reduced prints for the engravers to trace from on to their copper-plates, and was not extended to producing maps for publication, owing to the expense and comparative slowness of production of photographic silver prints, compared with the lithographic or copper-plate impressions, to say nothing of their want of permanence.

Experiments were next made with some of the so-called carbon processes, then recently discovered in France by Poitevin and first worked in England by Pouncy, with the object of transferring the photographic design at once on to the copper-plate, instead of tracing from the photographs by hand. The results obtained were not very satisfactory and a trial was made of Mr. Asser's photolithographic process, which had been published shortly before. Although this process was not found quite adapted to the purpose intended, the advantages of a method whereby facsimile prints in lithographic ink might be obtained and transferred to zinc or stone, so as to permit of a large number of copies to be printed off as easily as from an ordinary lithographic transfer drawing, and with precisely the same advantages in respect to cheapness and permanence, were obvious; and in 1860, after several trials, Captain A. de Courcy Scott, R. E., who was in charge of the photographic operations at Southampton, perfected the process of photozincography, which has since been employed with so much success and advantage at the Ordnance Survey Office, Southampton, and in this country at the Survey Offices in Calcutta, Dehra Dún, Pána and Madras, as well as at other public and private institutions in other parts of the world.

By a curious coincidence, at the very time when this process was being worked out in England, Mr. W. Osborne, of Melbourne, Australia, independently perfected an almost identically similar process of photolithography, which has been extensively used in the Crown Lands Offices of Victoria and Adelaide for reproducing the maps of the Australian Surveys, and has also been worked commercially by Mr. Osborne in Europe and America.

These two processes, appear to have been the first instances of the practical application of photography to the reproduction and multiplication of maps for publication. They still remain, however, very extensively used, and are by the simplicity, cheapness and rapidity of their operations and the facilities they offer for the reproduction of maps of large size, of greater practical value than other processes which have since been brought forward with the same object, and are perhaps capable of producing finer results within the limits of a single negative.

In India, the ever-increasing wants in the way of communications by rail, road and river, and the rapid extension of irrigation and other

engineering projects, as well as the ordinary military, administrative and fiscal requirements make the early production of accurate maps a matter of very great necessity and importance, and as skilled lithographic draftsmen and engravers are scarcely to be obtained and must be trained as required, or brought from Europe at great expense, the subject of photographic reproduction as a means of quickly producing and publishing copies of the original maps of the Surveys, is much more important in this country than it is in Europe or other countries where skilled cartographic lithographers and engravers are comparatively numerous.

The success that had attended the introduction of photography at the Ordnance Survey Office for the reproduction and reduction of maps immediately attracted the notice of the Surveyor General of India, and the services of two trained sappers, with the necessary apparatus, having been obtained from England, a small beginning was made in Calcutta in 1862. Owing to difficulties experienced in working photolithography in the peculiar climate of Calcutta, and the unsuitability of the original maps for reproduction by the process, owing to their being coloured and brush-shaded, little advance was made in the practical working of photolithography or photozincography in India till 1865, when Mr. J. B. N. Hennessey, of the Great Trigonometrical Survey, who had devoted part of his furlough in England to going through a practical course of instruction in photozincography at the Ordnance Survey Office, Southampton, fairly established the process at the Office of the Superintendent of the Great Trigonometrical Survey at Dehra Dún. I and other officers of the Survey Department were trained under Mr. Hennessey, and, in 1867, photozincography was finally started in Calcutta by Capt. A. B. Melville, who officiated for me during my absence on furlough, and since 1869 it has been carried on under my own supervision. Photozincographic offices have also been established under the Bombay Government at Púna, and at the Revenue Survey Office in Madras for the reproduction of the maps of the Revenue and Settlement Surveys in those Presidencies as well as miscellaneous work for other departments. In both of these offices the Southampton process of photozincography is used with a few modifications, but in Madras photolithography is also used with equally good results, and is, I am told, preferred for very fine work.

Before the introduction of photography the publication of the results of the Surveys by the Surveyor General's Office could only be accomplished by the ordinary methods of lithography and engraving; and though much good work was done in the former manner by the very limited native agency available in this country, many maps had to be sent to England to be lithographed, while the whole of the engraving connected with the Atlas of India, on the scale of 4 miles to one inch, was done in England under considerable disadvantages. Even with this help it was found quite impossible that

the publication could keep pace with the surveys, and the consequence was that the record rooms became filled with valuable materials that often could not be turned to practical account till they had become antiquated and out of date. Now, on the contrary, by the aid of photozincography, the publishing branches are able to keep pace with the progress of the Surveys so closely that as a rule each season's mapping of all the 1-inch Topographical and some of the Revenue Surveys is reproduced and published before the drawing of the following season's maps is taken in hand. An immense amount of work is thus done that could never have been undertaken by lithography and engraving alone, even though the transfer of the engraving of the Atlas of India to Calcutta has greatly facilitated the early publication of the latest additions to the Atlas year by year. And not only are the ordinary departmental publications thus hastened, but a very large number of miscellaneous maps and drawings are reproduced specially for the use of other departments of the public service.

The following table of the work executed by the Photographic Branch of the Surveyor General's Office, Calcutta, during the year 1877, will give an idea of the very large extent to which photography is being used for the reproduction and publication of the results of the Imperial Surveys and other miscellaneous demands.

	Sections or Sheets.	Negative Plates.	Carbon Prints.	Silver Prints.	Photo :—Transfer Prints.	Transfers to Zinc or Stone.	Number of Pulls.	Number of Sheets Printed.
Topographical Maps,	167	272	..	218	241	106	20,775	21,215
Revenue Survey Maps,	233	263	..	..	297	71	22,370	18,320
District Maps,	6	22	..	..	8	3	6,664	5,084
General Maps,	42	199	..	46	176	44	9,359	6,629
City and Cantonment Plans,	59	104	..	63	122	37	8,580	8,580
Miscellaneous Maps, &c., ..	362	510	..	536	507	190	57,138	82,515
Proofs, .....	..	..	..	..	..	..	5,932	..
Photos. of Life Convicts, ..	..	..	348	..	..	..	..	..
Cadastral Maps, Bengal, ..	56	..	..	..	..	56	2,800	2,800
Total,	925	1,370	348	863	1,351	507	133,618	145,143
Cadastral Maps, N. W. P.,	2,113	3,973	..	..	4,047	2,218	99,450	99,450
Grand Total,	3,038	5,343	348	863	5,398	2,725	233,068	244,593

* 20,962·00 square feet.

† 22,027·40 square feet.

In the Great Trigonometrical Survey Office at Dehra Dún, during the year 1876-77, 117 maps and 30 charts, besides miscellaneous diagrams were photographed, and 25,529 copies printed from them; 297 blue prints and silver prints were also made.

At the Govt. Photozincographic Office, Púna, during the same year, the number of negatives taken was 2,745, the number of maps photozincographed was 1,798, and the number of copies printed off (including copies of 79 lithographs) was 74,739. Since the formation of the office, in 1867, to the present time 9,100 maps have been photozincographed.

The specific advantages to be gained by the use of photography for the reproduction of maps and plans are :

1. Rapidity of production and multiplication, especially when employed for copying subjects containing close and intricate details. The gain varies according to the amount of detail and the time that would be taken by a skilled draughtsman or engraver to make the copy by hand. For instance, a highly finished map that would take several months to lithograph or engrave, may by the aid of photography be copied and some hundreds of copies printed off within a week.

2. The perfect fidelity with which the most delicately minute and intricate details are copied. The most skilful and careful draughtsman is liable to make errors in copying, and never can attain the same accuracy of delineation, especially of minute objects, as is obtained with the camera.

3. The facility with which copies may be obtained on scales larger or smaller than the original. The extent to which this may be taken advantage of depends very much upon the object in view as well as upon the style of the original, and the relative thickness and size of the lines and details composing it; but notwithstanding certain drawbacks and inconveniences it may sometimes be attended with, this facility of enlarging or reducing the scale of an original drawing with the most perfect accuracy and with the absence of all personal error, is one of the most important advantages of photography, and its immense superiority in this respect over the pentagraph and other methods has been proved to be beyond question.

4. The comparative cheapness of the photographic methods. The relative cost of hand labour and photography is affected by several considerations, *e. g.*, the nature of the subject, the process employed, the number of copies made and the pay of the photographers as compared with that of draughtsmen. In most cases it will be found that when it is really an advantage to employ photography in reproducing maps for any particular purpose, the cost will be far less than it would be by employing hand labour.

Notwithstanding these advantages, the use of photography as a means of reproducing maps and plans for publication has not extended so much as

might have been expected, partly on account of defects inherent in photographic copying, and only to be overcome by great skill and long experience on the part of the photographer, and partly owing to the difficulty of making draughtsmen fully understand the requirements to be fulfilled when preparing maps to be reproduced by photography for publication, in order to produce satisfactory results, and that they must strictly refrain from using colour and draw the map neatly in black and white, so that every line may be reproduced of its proper strength, according as the map is to be copied on the same scale as the original or to be reduced.

It matters little how roughly drawn or highly coloured an original drawing or map may be, if it is intended to lithograph or engrave it, because a skilled lithographer or engraver can easily put it into proper and conventional form; but when such a drawing is handed to the photographer he can only produce a facsimile of it with all its deficiencies—the coloured details hidden under a black mass of shade, the finer parts perhaps wanting altogether, the writing rough and broken, or so small as to be almost invisible, besides other defects caused by the unsuitableness of the drawing for reproduction by photography, and these defects are liable to be unduly attributed to the process.

These difficulties were felt in all their force when it was first determined to introduce photozincography for the publication of the maps of the Imperial Indian Surveys, because till that time these maps had been drawn in a very delicate, highly finished style, with many of the details on them coloured and the hill features shown by brush shading. It was soon seen that an entire change of style was necessary and that the original maps prepared specially for photographic reproduction, must be drawn in pen and ink lines alone, without colour or brush-shading. It was some time before the desired results were obtained, but after several years' experience a high degree of excellence has been attained in the preparation of original maps suitable for photographic reproduction, and now all maps of the above Surveys and most of the miscellaneous maps and drawings received from other departments are drawn with this object.

The change of style has been regretted by some as spoiling the beauty and finish of the maps, and the want of colour certainly has some drawbacks, but there can be no doubt that the necessity for drawing the original maps so that they may be fit for immediate publication has effected here, as it has also been found to do wherever photozincography or photolithography has been introduced, an immense improvement in the style of drawing of the manuscript maps as well as in the accurate delineation of the ground. The photozincographed copies as a rule appear somewhat coarse and rough when compared with good lithographs or engravings, but they possess the great advantage of being produced quickly and cheaply; while

being absolute facsimiles of the original maps submitted by the surveyors, they are entirely free from the errors that even the most careful draughtsman is liable to make when copying by hand, and they faithfully preserve the appearance and character of the ground exactly as delineated by the surveyor.

In most foreign topographical establishments, I believe, the principal use of photography is for making reductions, and not so much for the reproduction of maps on the same scale as the originals. In India, however, photozincography is very largely used for full-scale reproductions. Thus, the whole of the standard maps of the Topographical Surveys on the scale of 1-inch to the mile and the Cadastral village maps of the Revenue Survey, on the scales of 32 inches to the mile, for Bengal, and 16 inches to the mile, for the N.-W. Provinces, are reproduced on the same scale and are not reduced for publication on any smaller scale. In some cases, however, the surveys are made and drawn on the scale of two inches to a mile and are then reduced to one-inch, with a great improvement in the general appearance of the finished maps—reductions always appearing sharper and more highly finished than reproductions to scale. Some of the maps of the Revenue Surveys are reduced to the standard scale of 1-inch to the mile by a double reduction from the maps on the original scale of survey—4 inches to the mile. These are first photozincographed, in sections of convenient size, on the reduced scale of 2 inches to the mile and some prints are struck off in blue ink. Upon these blue prints, the draughtsman re-draws the map in a style suitable for a further reduction to one-half, leaving out all details not required on the 1-inch map and generalising the hill features, &c., so as to produce a proper effect when reduced. By the use of these blue prints, the labour of making a piecemeal reduction with the pantograph is saved, and the draughtsman can produce a more accurate result.

Silver print reductions to one-fourth of the standard 1-inch maps are made for the use of the engravers in preparing the sheets of the Atlas of India on the quarter-inch scale.

In the Photozincographic Offices at Puna and Madras more use appears to be made of reduction for the village maps than in the Calcutta Office.

The photographic processes applicable to the reproduction of maps are :

I.—*Photographic printing on Sensitive Papers.* In these methods prints are obtained on a sensitive surface of paper prepared with the salts of silver, platinum and iron, or with certain salts of chromium in conjunction with pigmented gelatine. In all of them the whole of the photographic operations connected with the printing have to be repeated for every impression.

II.—*Photo-lithography* or *Photo-zincography*, or the methods by which photographic image in greasy ink may be produced on, or transferred to, a lithographic stone or zinc plate and printed off in the lithographic press. The photographic operations cease with the production of the image in greasy ink, and the impressions are produced by the ordinary operations of lithographic printing. The use of these processes is, however, limited to the reproduction of subjects in line or dot, as they can only reproduce half tones in a very imperfect manner.

III.—*Photo-collotype*, or the method of producing a photographic image on a layer of gelatine applied on a suitable support, so that when the gelatine surface is moistened, impressions may be obtained from it in printing ink. By this method, also, a photographic image once produced on the printing surface of gelatine is capable of yielding some hundreds of impressions in the printing press; and instead of the subjects for reproduction being confined to those in dot or line, as in photo-zincography, any subject can be copied which is capable of giving a good photograph by the ordinary process of silver printing.

IV.—*Woodbury-type*, or the method whereby a photographic image is impressed into a soft metal plate, somewhat in the same manner as in the operation of nature-printing, forming a mould into which liquid coloured gelatine is poured and attached under pressure to a sheet of paper, thus yielding an image in which the lights and shades of the picture are formed by different thicknesses of coloured gelatine.

V.—*Heliography* or *Photo-engraving*, the method of obtaining on a metal plate a photographic image in intaglio capable of giving impressions in the copper-plate press. In this method the engraved plate once obtained serves for the impression of a large number of copies and may be indefinitely multiplied by electrotyping.

VI.—*Photo-typography*, or the method of obtaining by means of photography an image in relief on a metal plate, which may be mounted on a block to be set up with type and be printed in the ordinary printing press. These blocks may also be indefinitely multiplied by electrotyping in the same manner as ordinary woodcuts.

It will be observed that the five last-named processes all possess the great advantage that, once the photographic image has been obtained on the printing surface, the operations of printing can be accomplished by the same means and at the same rate as by the ordinary industrial methods. The printing may be performed by night or by day, quite independently of the agency of light, and requires no further chemical manipulations.

It would be beyond the scope of this paper to enter fully into the practical details of these various processes of photographic printing, as my object is merely to review those applicable to cartographic pur-

poses, and to give a summary of the principal methods that may be usefully employed with reference to the wants of the State or of private individuals, rather than to those of professional cartographers and map-publishers, though the latter may in many cases also find photography a useful auxiliary. Photographic methods can never entirely take the place of lithography or engraving by hand, either for public or private purposes, but their use may be advantageously extended. Those who wish for fuller details may consult the text-books by Abney, Carey Lea, Monckhoven, Vogel and others, and the special works referred to in this paper.

II. PREPARATION OF THE ORIGINAL DRAWING.

I have already adverted to the difficulty that has been found in this country and elsewhere in obtaining original drawings suitable for reproduction by photozincography, and to the fact that without a proper original drawing it is quite impossible to produce satisfactory results. Besides its principal use in reproducing maps of the Surveys, photozincography is very largely utilised in India by engineers for the reproduction of their plans and drawings, and by other public officers for an immense variety of miscellaneous maps and plans, and as we were constantly asked to photozincograph subjects utterly unsuitable to the process, a set of rules for the preparation of the original drawings for reproduction by photozincography was drawn up under General Thuillier's direction and published in the official Gazettes all over India, and the result has been a great improvement in the execution of the drawings we receive for reproduction.

The rules are as follows:—

1. All drawings should be on white, smooth-surfaced paper, free from dirt, pencil marks, creases and wrinkles. When possible they should remain stretched on the drawing-board.

2. The Indian ink should be freshly rubbed down and give good *black* lines, free from glaze.

3. The lines should be firm and cleanly drawn—not too fine or too close together. They must be quite *black*, and light effects must be produced by fine and open black lines, and never by the use of *pale* ink. Thick lines in the printing and borders of maps should be well filled in. Pencil marks should be carefully removed, so as not to injure the blackness and firmness of the lines.

4. All cross-hatching and shading should be as open and clear as possible, and the lines composing it firm and not too fine. Intensity of shade must be shown rather by an increase in the thickness of the lines than by placing them closer together, in order that the intermediate spaces may not become blocked up when transferred to zinc. It is better not to rule the shading of mechanical and architectural section-drawings, but to

show the shaded parts by a light tint of blue, violet, or *aniline* red (fuschine or roseine). These parts will reproduce white, and can have a ruled tint transferred on the stone or zinc in the usual way, which will give a much neater appearance.

5. In plans or drawings intended for photozincography, *washes* of any colour except very pale blue, violet, or aniline red, are absolutely inadmissible. Outlines, may, however, be drawn, if necessary, in any strong red, brown, yellow, orange or green pigment which will reproduce black. Any details required to be shown in the original, but not in the copy, may be drawn in pale blue, violet, or aniline red. Details that are not required to be reproduced may be painted out with Chinese white.

6. River courses, lakes and tanks should be left blank, and not filled in with fine lines. They may be indicated by a pale wash of *blue* without detriment to their reproduction.

7. When drawings are to be reduced care must be taken to draw the lines, lettering, and detail of sufficient thickness and size relatively to the scale of reduction, so that they may not be lost or illegible when reduced. Sufficient space must also be left between the lines to prevent subsequent blocking up.

8. When possible, drawings should be made on a larger scale than they are required to be copied. Photographic reductions are always sharper and firmer than reproductions to the same scale, and defects in drawing are lessened by reduction.

9. Where plans or drawings to scale are to be reduced, the scale should be given in terms of a single unit of measurement and not as relative to any second unit. Thus, the scale on a map drawn on the scale of 4 miles to an inch for reduction to 16 miles to an inch, should be shown simply as a "scale of miles."

10. As photography produces a more or less perfect *facsimile* of the original drawing, it is essential that drawings intended for publication should be complete and finished in every respect before they are made over to the photographer. The drawing, printing of names, &c., should be in as neat a style as possible, and not require to be altered or touched up. The hair-strokes of the printing should not be too fine.

The foregoing rules may be summed up in a few words :—WHITE-PAPER, BLACK-INK, and FIRM OPEN DRAWING ; and as success in the after processes depends entirely upon the perfection of the original drawing and its capability of giving a negative on which the ground is perfectly opaque while the lines are quite clear and as transparent as the bare glass, these essentials must be most carefully observed. Their neglect will entail failure and disappointment.

For drawings intended for reproduction by the collotype methods these

rules are equally applicable, especially No. 7, and there is even more necessity for perfect cleanliness of the paper and neatness and finish of the drawing, because the faintest tints will be reproduced by the gelatine printing surface and corrections cannot be made on it, as they can on zinc, stone or copper. For this reason also, the greatest care must be taken to complete the drawing in every respect before it is given to be reproduced. Drawings in line may be finer and more delicate than for photolithography, but still must not be so fine as to interfere with the obtaining of a perfectly dense and opaque negative, otherwise the ground of the print will appear dirty and stained. Pale ink may be used when necessary for effect, but not more than is really requisite. Colour may be used to any extent, having always due regard to the photographic effect when reproduced. On account of the difficulty of photographing certain colours so as to produce the same effect as in the original picture, the best results will be produced from drawings specially prepared in monochrome, such as Indian ink or sepia.

In the case of drawings for any special purpose or not intended for publication, the above rules may be relaxed, but the general principles laid down should be observed, as far as practicable, if the best results are desired.

When drawings are prepared specially for photographic reproduction, there need be no difficulty in taking all the precautions necessary for producing good results. It often happens, however, that the photographer is called upon to reproduce drawings, lithographs, or old MSS., printed records, or engravings, which either may never have been suitable for the purpose, or, if suitable when fresh, have become dirty and stained by age. Herr Seamoni, the skilful Chief of the Photographic Department of the Imperial State Paper Office at St. Petersburg, has given some useful hints on the treatment of such subjects under these circumstances.*

"Yellow, or otherwise objectionable, spots should be carefully covered over in the spaces between the lines with Chinese white, and whenever possible the lines should be strengthened in parts where they appear weak."

"Lithographs and engravings may be bleached, by immersion in a solution of chloride of lime, or *Eau de Javelle*, (1 to 10 or 15 of water), then soaked in water for some hours, after which they are treated with a weak solution of hyposulphite of soda and finally well rinsed in clean water."

"Fresh grease stains may be removed with chloroform, benzine and ether, or with a weak alkaline solution of caustic potash or its carbonate."

"Old grease stains may be removed with a more or less strong solution of potash, applied at the back of the subject."

* *Handbuch der Heliographie*, p. 67.

"Iron mould and ink spots may be taken out with a solution of oxalic acid or salts of sorrel."

When tracings are made on paper or vellum cloth to be reproduced without the aid of the camera, special care must be taken to keep the back of the drawing clean, and to choose paper or cloth free from stains and of as even a texture as possible.

Originals drawn on rough paper may be smoothed in a copper plate press, and, if dirty, should be carefully cleaned with india-rubber or bread.

III. THE PRODUCTION OF THE NEGATIVE.

After the due preparation of the original, the production of the negative is a point of the utmost importance, and may well be considered by itself before proceeding to the consideration of the various processes of photographic printing.

In order to obtain the most satisfactory results for photolithography, photozincography, or any other process specially applicable to line subjects, the negative must be perfectly sharp all over, free from distortion and possess the greatest amount of contrast between the lines and the ground. If care is taken to produce good negatives from suitable originals, results may be obtained which will compare with ordinary lithographs and engravings for sharpness and delicacy. The difference in the results of working with good negatives or bad ones is incredible; with a good negative from a good original every thing works well, but with a bad negative from a faulty original all kinds of difficulties may be encountered, and the attainment of a passable result is almost a matter of chance.

The first thing is to arrange the plan so that it may be copied without any distortion and be quite sharp all over.

To ensure freedom from distortion, the lens employed must give an image quite free from all curvature of the marginal lines of a rectangle. In practice the most suitable forms have been found to be the 'Rectilinear' of Dallmeyer; the 'Doublet' of Ross; 'Aplanatic' of Steinheil and others on the same principle. The lenses known as triple combinations are also good. In the Surveyor General's Office, Calcutta, Dallmeyer's Rapid Rectilinears are used and found to answer well. The lens should be worked well within its power, so as to use the most central rays; and to secure the sharpness of the image all over the plate, a small stop or diaphragm should be used.

The plan must be placed so as to be evenly illuminated by a good strong light falling as horizontally as possible, in order to avoid shadows being thrown by the grain of the paper, and thus diminishing the even opacity of the ground of the negative.

The apparatus for supporting the plans varies according to the nature of the work required, and may either be a perfectly smooth board fixed permanently in a truly vertical position against a wall or other support, a form which is very suitable when large plans have to be copied or reduced; or it may consist of a frame large enough to take a certain size of map and capable of being adjusted in various ways so as to move up and down in a vertical plane or horizontally right and left, so that different parts of the plan may be brought in front of the camera without moving the plan on the board.* In any case, arrangements must exist, either in the plan-board or in the camera-stand, for making the plane of the map or plan to be copied exactly parallel to the plane of the sensitive plate in the camera.

The map must be attached to the plan-board so that it may lie perfectly flat and free from ridges. This is best secured by placing in front of it a sheet of glass which is fastened down on the board with pins at the corners. Or a glazed frame may be used for holding plans of a medium size. In either of these cases care must be taken to avoid any reflection from light objects in front of the plan-board.

It is convenient to have the plan-board and the focussing glass of the camera ruled in squares of 1 inch or other convenient size, in order to at once test the perfect parallelism of the sensitive plate and the plan-board.

When the work is confined to the reproduction or reduction of maps or other subjects of one fixed size on a single plate, it will be found convenient to draw a rectangle of the required size on the ground glass of the camera. When the image of the subject exactly fills this rectangle the adjustments of focus and parallelism will be correct.

The camera used for reproduction to scale should be at least of sufficient length to draw out to twice the equivalent focal length of the largest lens it is to be used with, and may be furnished with cone fronts to give further extension if necessary. With large cameras of a long range of focus it will be found convenient to have the back part of the camera fixed and the front part carrying the lens moveable, so as to enable the operator to focus conveniently. The camera may be fixed on a stand furnished with adjustments for moving it horizontally right or left, and have a tilting motion up and down, in order to adjust the camera perfectly level, or tilt it slightly so as to correct any want of verticality of the plan-board. The camera-stand should run upon rails fixed in the ground at right angles to the wall carrying the plan-board, thus enabling the distance of the camera from the plan-board to be easily and accurately adjusted according to the scale required. When using a reversing mirror or prism for taking re-

* See my '*Report on the Cartographic Applications of Photography*,' plates V, VII and X, and Sir H. James' '*Photozincography*,' plates I and II.

versed negatives for collotype and other purposes, it is a good plan, when possible, to have an arrangement for laying the plan horizontally under the lens at any convenient distance from it.

The whole of the apparatus connected with the camera and plan-board must be rigid and firmly fixed, so as to be free from vibration. The slightest vibration is sufficient to destroy the perfect sharpness of the image. In the glass-house attached to the Photographic Branch of the Surveyor General's Office here, I have endeavoured, and I think with success, to overcome all vibration caused by carriages passing in the street close by, by dividing the floor of the camera-room into isolated blocks resting on a bed of sand, so that each camera shall stand by itself on a block isolated from adjoining blocks and from the walls and floor of the building. The plan-boards are fixed on a separate wall quite isolated from the walls of the building.

Plans may be copied either in the open air or under shelter—coloured and old stained manuscripts, maps or drawings are better copied in full sunlight. The glass-house I have constructed at the Surveyor General's Office faces the south and is glazed with ground glass, so that a strong diffused light may be thrown upon the plan-boards. When circumstances permit, it is well to have the camera and plan-board mounted on a firm stand working on a pivot, so that, as the day wears on, the position of the plan-boards may be changed so as always to face the sun. I adopted this arrangement at the Trigonometrical Survey Office, Dehra Dun, and I believe it has many advantages over the fixed glass-house rendered necessary in Calcutta by the constant wind and dust, and the greater necessity of being able to carry on work without interruption at all times of the year.

The negatives of maps &c., drawn in line only, for reproduction by photozincography, are taken by the ordinary wet collodion process with iron development, modified so as to secure the greatest transparence in the lines and density of the ground; but as the ordinary wet collodion process by itself will not give all the intensity required to produce an almost opaque ground, it is obtained by intensifying the negative in the usual way with pyrogallie acid and silver, after fixing; then treating it with a saturated solution of bichloride of mercury till the film becomes white, and finally applying a dilute solution of hydrosulphate of ammonia, which instantly changes the colour of the film to a dense black or brown throughout. The negative is afterwards varnished with a resinous varnish, or flowed over, while wet, with a solution of gum or gelatine and allowed to dry. All defects, pin-marks &c., are then stopped out with Indian ink or black varnish. In taking the large negatives on plates 32×24 , that we are now producing for copying the maps of the Cadastral Surveys, it has been found that the first intensification may be produced by washing the plate after the first develop-

ment and applying a weak solution of nitrate of silver followed by a second application of the iron developer.

Other methods of obtaining the extra density required for these negatives have been proposed and are in use,* but, notwithstanding several inconveniences arising from the use of bichloride of mercury and hydrosulphate of ammonia, the above appears to be the best and most certain when working on the large scale.

When maps are not drawn entirely in pen and ink but have the hills brush shaded, and it is desired to reproduce them by the collotype or engraving processes, great care and skill are required on the part of the photographer to get the ground of the negative dense enough to give a perfectly clean impression in the white parts of the map, and at the same time prevent the grain of the paper from showing and give the faintest tints of the shading their proper value. Coloured maps also give a good deal of trouble, and when allowable the colour should be washed off as much as possible before the negatives are taken. Colours may sometimes be removed by chemical means, but there is risk of injury to the original.

In many of the processes about to be described it is necessary to use a negative which instead of giving an image reading the same way as the original shall give it reversed as to right and left. There are several methods of obtaining these reversed negatives.

(1.) By coating the original unreversed negative with a thick transfer collodion,† or a layer of gelatine, and then stripping off the film and, either laying it down again on a sheet of glass in a reversed position, or using it as a film negative which may be used for giving both reversed or unreversed images. This method is practical and useful, but is not suitable for map work on account of the liability to contraction and distortion of the image. There is also difficulty in keeping the film negatives flat, and they have been found to become brittle and perish very soon in this climate.

(2.) By turning the sensitive plate in the camera, so that the light acts, through the glass, on the back surface of the film. This method is also practical, simple and useful, but requires care in the selection of glass plates free from scratches, &c., and in wiping the back of the plate before it is put in the camera. It is used in the Belgian Topographical Bureau with dry tannin plates, but I have not found it suitable for reproducing very fine map-work on wet plates.

(3.) By placing a reversing mirror or prism in front of the lens—the image thus passes through the lens reversed and is impressed directly on the sensitive plate. This is one of the simplest and most effectual of all methods. If a mirror is used it should be one silvered by depositing silver

* See Abney, *Instruction in Photography*, p. 22.

† See the same work, p. 160.

on the front surface and should be large enough not to cut off the oblique rays entering the lens. A large solid reversing prism is expensive and heavy, but for moderate sizes an efficient instrument may be made by building up a hollow prism with glass plates and filling it with a transparent fluid having a suitable index of refraction. M. Derogy, of Paris, has just invented an ingenious and economical method of employing a reversing prism by placing a small prism between the lenses. I have not seen any results of this arrangement, but it seems likely to be as effective as it is simple.

(4.) By what is known as the 'dusting on' or 'powder' process. A glass plate is coated with a mixture of gum, sugar and bichromate of potash dissolved in water, thoroughly dried with heat, and then exposed to light under a negative. After removal from the printing frame, the gummy film is dusted over with very fine plumbago which adheres to it in inverse proportion to the action of light, *i. e.*, those parts on which the light has acted refuse the powder in proportion to the intensity of the action of light, while the protected parts, attracting moisture from the air and so becoming 'tacky,' take the powder readily, and thus an exact transcript of the original negative is produced, but reversed. This method is simple and effective and seems to be one of the best that can be employed when a mirror or prism is not available, or when, as is frequently the case, the reversed negative can only be obtained by copying from a single original unreversed negative.

(5.) By making a copy, either in the camera or by contact, on a film of collodio-bromide of silver. The image is developed as usual by the alkaline method, and then treated with nitric acid which dissolves the reduced silver in the exposed parts of the film, leaving the bromide in the unexposed parts; the plate is then again exposed to light and developed. This method, proposed, I believe, by the late Mr. Sutton, is said to give very good results, but the use of nitric acid is an obvious disadvantage.

(6.) By copying in the camera, first making a transmitted positive either by the collodion process or with a special pigmented gelatine tissue. This method is most useful when the reversed negative is required to be either larger or smaller than the original.

(7.) By means of the reversing action of the red and blue rays of the spectrum. This method is a discovery of my own and has not yet been thoroughly worked out; it is, however, simple and could, I believe, be successfully utilised. A film of collodio-bromide of silver stained with anilin blue is exposed to light for a few moments, then placed under a negative in a printing frame in front of which is a sheet of red glass, and exposed to light. The action of the light passing through the red glass in the clear part of the negative is to neutralise or destroy the effect of the previous exposure of the plate to light, and on development a more or less perfect reversed

negative image is obtained. For line subjects a blue glass may also be used, but for half-tone work only a red glass can be employed.

In some processes also, it is convenient to use either direct or reversed transparent positives instead of negatives. These can be obtained either by contact printing on dry collodion plates or gelatine tissue, or in the camera, in the manner adopted for making transparencies, as described in the text-books.

Having now described the preliminary operations for preparing the original and producing the negative, which are common to all processes, we may proceed to the consideration of the different printing processes which, as stated in the introduction, may be divided into 6 classes, *viz.* :

I. Printing on sensitive papers. II. Photo-lithography or Photo-zincography. III. Photo-collotype. IV. Woodbury-type. V. Helio-graphy or Photo-engraving. VI. Photo-typography.

IV. PHOTOGRAPHIC PRINTING ON SENSITIVE PAPERS.

The processes under this head may be divided into three classes—

First:—Those in which the sensitive papers are prepared with salts of silver and the results are not permanent.

Secondly:—Those in which the sensitive papers are prepared with the salts of iron, platinum and other metals, and the prints though not absolutely permanent are more so than silver prints.

Thirdly:—Those in which coloured gelatine or other colloid mixed with an alkaline bichromate forms the sensitive surface and yields prints which, for all practical purposes, may be considered perfectly permanent.

Silver-printing.—Notwithstanding its expensiveness and the want of permanence of the prints, silver printing has hitherto maintained the first place among photographic printing processes, and though very nearly equalled, is as yet unsurpassed for the beauty and delicacy of its results. It is the process in most extensive use for producing copies of portraits and views, and although rapid advances are being made in more permanent methods, it is likely to be a long time before the beautiful but perishable silver print is entirely superseded.

The following brief outline of the operations will be sufficient to show the nature of the process.*

A sheet of paper coated with albumen containing an alkaline chloride, such as common salt, or paper which has merely been immersed in a solution of such salt and dried, is floated on a solution of nitrate of silver and allowed to dry in the dark. It is then placed above the negative in a copying frame, which is so constructed that the light may pass freely through the negative, and at the same time may admit of the examination

* For details, see Abney's *Instruction in Photography*, p. 113.

of the print while the back surface of the sensitive paper is shielded from light. The exposure to light lasts for some minutes, by which the parts unprotected by the denser parts of the negative are darkened more or less, according to its translucency, while the parts entirely shielded from the light remain quite white. When the action of the light is judged sufficient, the sensitive paper is removed from the frame in a dark place, and must then undergo an operation of *fixing* to remove the unchanged salts of silver, which would cause the print to darken unless carefully protected from the light. This is effected by steeping the print for a short time in a solution of hyposulphite of soda; but before the print undergoes this indispensable operation it is usual to place it in a solution of chloride of gold, by which part of the reduced silver forming the image is replaced by a film of gold and the print takes a more agreeable tone, also becoming more permanent than it would be if this operation, called 'toning,' were omitted. It is, however, impossible to ensure perfect permanency of these prints, by reason of the sulphur contained in the albumen or in traces of sulphur salts formed by the decomposition of the hyposulphite of soda, and left in the print after even the most careful washing, slowly acting on the reduced silver forming the image and converting it into a sulphide, by which the tone and brilliancy of the picture are lost, and the lighter shades appear to fade away entirely. It should, however, be stated that prints prepared on plain, or unalbumenised, paper are more permanent than the albumenised prints, though not so brilliant, sharp and delicate; and they have the further advantage of being less liable to shrinkage and distortion than the albumenised prints, and are thus more suitable for the reproduction of maps where accuracy of scale is a desideratum.

It is evident that owing to the expensiveness of the materials used in producing these prints and their want of permanency, together with the slow rate at which they can be produced, this process is almost useless for the reproduction of maps in large numbers; and, in fact, its use in cartography is limited to making copies of special maps for immediate reference or temporary purposes, and as guides for engravers or lithographers in preparing compilations from maps on a larger scale. Silver prints have also been used by engravers to obtain a correct tracing on the waxed surface of their copper plates, but unless these prints are prepared with great care they are open to the objection of becoming distorted and untrue to scale by the contractions and expansions caused by the successive washings they have to undergo. Prints on plain paper are better for this purpose than those on albumenised paper, and prints on paper containing a large proportion of resin in the size are better still.

In the English Ordnance Survey the topographers are furnished with silver-print reductions from the large scale outline survey, on which

they insert the features of the ground, suitably delineated according to the scale.

A very early application of this process has lately been re-introduced in Germany by Herr Romain Talbot, of Berlin, under the title of the *Licht-paus* process, with the object of enabling engineers and others to readily prepare a few copies of their plans without the necessity of using a camera and other expensive appliances. In this method a print on a sensitive chlorised paper, prepared with nitrate of silver and an organic acid, so that it may be kept for some time in stock ready for use, is first taken by exposing it to light under the original drawing itself, which to secure the best results should be drawn in very black ink on thin paper or vellum cloth. This print, on which the lines are clear and the ground opaque, is simply fixed in a solution of hyposulphite of soda and then thoroughly washed and dried. A second copy is now made from this negative print in exactly the same way, and as, this time, the lines darken under the clear parts of the negative and the ground remains clear, we obtain a perfect transcript of the original. This process is said to be largely used in Germany for copying maps and engineering plans. It is no doubt useful in many cases where it is undesirable or impossible to make more extensive photographic arrangements, but besides being limited to the reproduction of copies on the same scale as the original, it labours under the disadvantages of expense and want of permanency common to all the silver printing processes.

In the processes just noticed the exposure to light is usually from 15 to 30 minutes, but in dull weather, or with certain negatives, it may be much longer; it is obvious, therefore, that even under the most favourable conditions comparatively few prints can be produced from a single negative in a day. In order to shorten the exposure and permit prints to be produced with much greater rapidity than with the ordinary process, a method has been introduced by Major Libois of the Belgian army, by which, instead of the image being produced at once in its full strength by the action of light, the latter is only allowed to act for a few seconds, and the full effect is produced by treating the print with a developing agent composed principally of gallic acid, which at once reduces the silver in the parts acted on by the light, and thus produces a visible image in place of the almost invisible one formed by the action of the light alone. This process was extensively used in the *Depôt de la Guerre*, Paris, some years ago, and large numbers of maps were turned out by it, I was told, almost as quickly as they could have been printed in the press, and it had the further advantage that facsimile copies could be made of maps from which good results could not have been obtained by photolithography. The same process was used at the *Depôt de la Guerre* in Brussels, but not on so large a scale. I have also used it with success in India, and it may be recommended in

cases where silver printing is required for maps &c. It is more economical than the ordinary process, and much more rapid in working, the exposure being counted by seconds instead of by minutes. The operations are briefly as follows :

Thin photographic paper is salted by floating on a solution containing 2 per cent each of chloride of ammonium and citrate of soda in water slightly acidified with citric acid. The paper is dried and may be kept for use. It is sensitised by floating in the dark on a bath containing 5 per cent of nitrate of silver acidified with a little citric acid. The exposure to light is conducted in the same way as in the ordinary process, but is exceedingly short—a few seconds to one minute being generally sufficient. When taken from the printing frame only a very feeble image is visible, it is therefore developed in a mixture of a solution of gallic acid (1 to 3800 water) with a solution of acetate of lead (1 to 200 water), to which a little acetic acid is added. The detail gradually strengthens, and in about a quarter of an hour the prints are fully developed and of a good black colour. After being washed they are fixed in a bath of hyposulphite of soda at 30 per cent., then well washed and dried.*

The foregoing are the principal methods of silver printing suitable for cartographic purposes, but, however convenient and useful they may be for special objects where photolithography is not applicable, they cannot be considered adapted for purposes of publication, and their want of permanency is an insuperable defect.

Printing with Salts of Iron.—From time to time attention has been drawn to the possibility of replacing silver-printing by processes depending on the use of the salts of iron and other cheap materials, but, though certainly useful in some respects, they have never been brought into extensive practical use.

One of the best known of these processes is the 'cyanotype', invented by Sir John Herschel, and lately re-introduced by Messrs. Marion & Co., of Paris, who prepare and supply the ferro-prussiate paper ready for use. Good even-textured paper is brushed over with a mixture containing nearly equal proportions of 10 or 12 per cent solutions of ammonio-citrate of iron and the ferridcyanide of potassium, dried and exposed to light under a print or drawing placed with the printed side uppermost. The resulting faint photographic image is developed and fixed by a mere washing in plain water, yielding a print in white or light blue lines on a dark blue ground.

This process is rapid, simple and cheap. The camera is dispensed with, and the only photographic apparatus required is a printing frame and

* Maës and Hannot's *Traité de Topographie et de Reproduction des Cartes au moyen de la Photographie*, p. 295.

one or two dishes or trays. The sensitive paper is easily prepared and can be kept indefinitely in the dark until required for use. There is no messing with chemicals after the preparation of the paper, pure water only being required to develop and fix the prints. The exposure to the light is very short, two or three minutes in the sun being ample to make a clear legible copy from a line negative or from a drawing on tracing cloth. The chemicals employed are both very inexpensive.

The objections to the process are two: first the difficulty of obtaining clear whites; this, however, is of no consequence so long as the details are clearly legible; and secondly, the colour of the prints—white on a dark blue ground. Although this does not interfere with the practical use of the process for special work, it completely prevents it from being employed as a means of multiplying copies of maps or plans on a large scale. Another defect is, the want of sharpness arising from the necessity for placing the reverse side of the original in contact with the sensitive paper in order to get an unreversed print. These objections may be partly obviated by printing from a negative on paper or glass, in which case the lines will be dark blue on a light blue or white ground, but then cameras and other expensive photographic apparatus will be required to produce the negative.

M. H. Pellet has recently recommended a process of this kind whereby prints are obtained in dark lines on a clear ground. Paper is sensitised in a mixture of—

Oxalic acid,	...	...	...	5 parts
Perchloride of Iron,	...	...	...	10 „
Water,	...	...	...	100 „

dried and exposed as usual under a drawing. The print is developed in a bath of yellow prussiate of potash at 15 or 18 per cent, well washed and fixed with dilute muriatic acid, then finally washed and dried.

The blue prints thus produced can also be used as the basis of drawings for photozincography.

Another process, which, though not quite so simple as the above, has the advantage of giving a print in black on a white ground, forms one of the numerous important photographic methods for which we are indebted to the illustrious Poitevin.

Paper is coated in the dark with a solution of perchloride of iron and tartaric acid in water; when dry, it is exposed under a tracing on cloth or paper, or a reversed positive on glass, and as soon as the parts exposed to the light have become thoroughly bleached the print is removed and developed in a bath of gallic acid. The parts protected from the light turn to an inky black, while the exposed and bleached parts remain white or only take a slight tint. The print is then thoroughly washed and dried. The whole

operations of printing, developing and washing can be finished in half an hour. This process, simple as it appears, requires certain precautions in using a strongly sized paper for the prints, and a very transparent original to obtain the most successful results.

It is capable of the same applications as the cyanotype last described, and, like it, is quite unsuitable for producing maps for publication.

Another process of Poitevin's is dependent on the property possessed by the ferric salts of rendering gelatine insoluble, the solubility being, however, restored when the ferric salt is decomposed by the action of light into the ferrous salt.

Paper is thinly coated with a 6 per cent solution of coloured gelatine and when dry immersed in a solution of—

Perechloride of Iron,	10 parts	or* 1 to 3 parts.
Tartaric acid,	3 „	„ $\frac{1}{2}$ to 1 „
Water,	100 „	„ 100 „

and dried in the dark. After exposure to light under a positive, such as a map on tracing paper, the print is immersed in hot water, and the gelatine in the parts exposed to light dissolves out, leaving an exact transcript of the original drawing with dark lines on a white ground. The print may be rinsed in water acidulated with hydrochloric acid to remove the iron salt.

Salmon and Garnier have taken advantage of the fact that if paper is coated with a solution of the perechlorate of iron and exposed to the light, the parts exposed to the light become hygroscopic in inverse proportion to the intensity of the action of light, and therefore if such paper is exposed to light under a map or drawing on thin paper or vellum cloth, and afterwards brushed over with a fine powder, such as lamp-black or plumbago, more or less of the powder will adhere to the parts protected from the light, while the exposed parts will scarcely take it at all. After development the print has only to be washed to remove the unaltered iron salt from the film.

Other similar processes of printing with the salts of iron, uranium &c., will be found in the text-books. They are, however, very little used and may be regarded more as curiosities than as practical printing methods.

Platinum printing process.—There is, however, one process which deserves mention as producing very beautiful and permanent prints, in which the image is formed of reduced platinum. This process has been patented by the inventor, Mr. W. Willis, junior. Paper is floated on a weak solution of nitrate of silver and dried. It is then brushed over with a solution of double oxalate of potassium and iron, together with a solution of chloroplatinite of potassium. After exposure under a negative the print is floated on a warm solution of oxalate of potash, which causes the platinum

* Boivin, in *Moniteur de la Photographie*, 1st April, 1878.

salt to be reduced in the parts exposed to the light. The prints are fixed first with hyposulphite of soda, and then with oxalate of potash and finally washed with water.

Collo-chromate printing.—We now come to the more important processes depending on the reaction of the salts of chromium, particularly the alkaline bichromates, on gelatine, gum, albumen and other colloid substances under the influence of light, whereby these substances become more or less insoluble in and unabsorbent of water in proportion to the amount of the action of light, and further acquire the property of taking up greasy ink and not attracting plumbago or other fine dry powder, also in proportion to the amount of the action of light upon them.

This simple reaction, only partially discovered in 1839 by Mungo Ponton, was first worked out and turned to practical account, some twelve years afterwards, by Fox Talbot in his process of photoglyphic engraving; and after him Pretsch and, notably, Poitevin employed it in processes which have been the foundation of nearly all the modern methods of permanent photographic printing.

The simplest of all these processes, and one which may render useful service in the cases already noticed where only a few copies are required, was one of the first published by Poitevin. It consists in coating paper with a mixture of albumen, gum, or gelatine and bichromate of potash, coloured with Indian ink or any other suitable pigment; or, if preferred, the paper may be coated with coloured gelatine and then made sensitive in a separate bath of bichromate of potash, and this is sometimes the best method, because the paper will not keep good for long in its sensitive state. The sensitive coloured paper is exposed under a very clear line negative in a copying frame for a few minutes, and then taken out and plunged into water; either hot or cold, according as gelatine, gum or albumen have been used. The unaltered colloid in the lights of the print, which have been protected from the light under the dark parts of the negative, dissolves in the water, leaving a clear image in pigment on a white ground.

This simple method is capable of extensive use in copying maps or topographical sketches, but is only applicable to subjects in line, well drawn in black and white in accordance with the rules in Sect. III. These prints have the advantage of being quite permanent and, as the collo-chromate mixture is more sensitive to light than the chloride of silver, they can be produced at a quicker rate than the silver prints, and are, of course, cheaper on account of the inexpensiveness of the materials used.

For reproducing subjects in half tones a different procedure must be followed. In the process just described the exposure to light and the development of the print by washing are effected on the coloured side of the paper, and as the light can act with full power through the clear spaces on

the negative, representing the lines of the subject, it renders the colloid coating insoluble throughout the thickness of the coloured film, so that the lines withstand the solvent action of the warm water, which entirely removes the rest of the coloured film from the ground and parts which have not been influenced at all by the light. If, however, instead of a negative of a line subject, on which the lines are transparent and the ground opaque, we take a negative of a subject in half tones, possessing various degrees of translucency in the lights and shadows of the picture, and make a print from it on a piece of the pigmented paper, we shall find that the light will only be able to penetrate through the entire thickness of the colloid film in the deepest shadows, represented, as before, by nearly clear glass; in the darker half-tones it will penetrate nearly through the coating; in the middle tones about half-way through, and in the lightest tones the light will be able to act only on the surface of the gelatine. We shall therefore have a print with an insoluble surface of varying depth, and underlying this a more or less soluble layer; it will thus readily be understood that when exposed to the action of warm water this layer will dissolve and carry away with it the partially insoluble surface-film forming the half shades of the picture, leaving only the stronger shades and giving a rough, hard, and unfinished appearance to the print.

For a long time this difficulty proved a stumbling-block in the way of the progress of permanent printing and gave the silver-printing processes a supremacy of which it has now become difficult to deprive them. The Abbé Laborde was the first to see the necessity for adopting the principle of exposing on one side and developing on the other. Blair, Fargier and Swan applied this to the carbon process, and the latter finally succeeded in introducing a practical method of pigment-printing applicable to the same class of subjects as silver-printing. Swan prepared a tissue by coating paper with a thick layer of gelatine mixed with bichromate of potash and coloured with any suitable pigment. After the exposure to light the gelatinous surface of the tissue was caused to adhere closely to a second piece of paper coated with india-rubber. The whole being immersed in hot water, the paper on which the gelatinous layer was originally supported, became loosened and could be removed, allowing the hot water to gradually dissolve away the unaltered and soluble gelatine. In this manner the exposure to light takes place on one side of the gelatine film, while the washing away of the superfluous gelatine is effected from the other, or unexposed side, without disturbing in any way the exposed parts of the film, and thus the most delicate shades in the half tones are perfectly preserved. Since its introduction by Swan this process has been much improved by Messrs. J. R. Johnson, R. Sawyer and other members of the London Autotype Company which acquired Swan's patents, and under



the name of the 'Autotype' process, it has been worked on a large commercial scale for the reproduction of works of art, and is now fairly beginning to come into active competition with silver-printing for all ordinary purposes of portrait and landscape photography.

On the Continent, the pigment-printing process is largely used by the well-known houses of Braun and Goupil for the reproduction of works of art, and is also coming into extended use for general purposes.

The following is an outline of the operations as now practised by the Autotype Company.*

The pigment tissue is prepared by coating long bands of paper with a moderately thick layer of gelatine coloured with any suitable pigment, and is sold ready for use either in an insensitive or sensitive condition.

The tissue is sensitised by immersion for a minute or two in a 5 per cent solution of bichromate of potash in water, to which some alcohol may be added with advantage, especially in hot climates; the bath should also be cooled down with ice if its temperature exceeds 65°. The tissue is then carefully dried, and when dry is ready to be exposed under the negative. This is done in a printing-frame in the usual way, the only precaution necessary being to paste slips of thin grey paper round the edges of the negative, so as to cut off a great portion of the light and form what is called the 'safe edge'. As the tissue generally appears black all over, the progress of the printing cannot be ascertained by inspection, and it is necessary to use a little instrument called an 'actinometer', by means of which, the degree of exposure necessary for any negative having been once ascertained, it is easy to give the same amount of exposure to successive prints. Up to this point the operations are the same whatever may be the nature of the support upon which the picture finally rests. The subsequent operations, however, differ accordingly as the image is developed on a final support, by what is called the 'single transfer' method, or on a temporary support, by the 'double transfer' method. In any case, some support is indispensable to retain the image and preserve it from injury during the washing.

In the single transfer process the support is paper coated with a gelatinous substance which, though insoluble in water, retains sufficient adhesive power when moistened to enable it to hold the picture during development and afterwards permanently.

After exposure under the negative the pigmented tissue having been immersed in cold water, together with a piece of the transfer paper, the two surfaces are applied to one another under water, and both drawn out together. They are then laid on a zinc plate, tissue uppermost, and brought into close

* See "*The Autotype Process*", 6th edition. Also Monckhoven's, Vidal's and Liesegang's treatises on Carbon-printing.

contact, all intervening air being driven out by means of an india-rubber scraper, or 'squeegee', which also removes all superfluous moisture. The prints and support are allowed to remain together for a short time, and are then immersed in warm water. After a little while the soluble gelatine will soften and become partially dissolved, when the paper forming the original support of the layer of gelatine may be gently removed, leaving a dark slimy-looking mass on the transfer paper. The soluble gelatine gradually clears away by the action of the hot water and reveals the image in more or less perfection of details according as the exposure has been properly timed. When fully developed, the print is washed with cold water, then passed through a solution of alum, rinsed again with water and allowed to dry.

Instead of paper, any other suitable permanent support may be used, but whatever the support may be, a reversed negative must be used if it is desired to obtain non-inverted pictures by the single transfer method.

When it is inconvenient to use a reversed negative, and it is desired to obtain a non-inverted picture—the development of the tissue-prints must be conducted by the double transfer method upon a temporary support, either rigid or flexible. The discovery that the pigment pictures might be developed upon any impermeable surface is due to Mr. J. R. Johnson, who also found that if such surface previously receive a coating of some fatty or resinous compound, the picture may be transferred, after development, to a final support.

The most suitable surface for the temporary support is a sheet of zinc, which may be either polished or grained; opal glass, or porcelain plates may also be used with advantage.

The plate employed as the temporary support first receives a coating of a solution of wax and resin in turpentine, and some operators coat the plate with collodion after the waxing, in order to improve the surface. The pigment tissue carrying the image is attached to the support under water in much the same way as in the single transfer method, and after remaining for a time, is developed in the same way and allowed to dry. The plate with the picture on it is then rinsed in water, and a piece of what is called double transfer paper—a fine paper coated with an enamel surface—having been soaked in water till quite soft, is laid on the wet plate, avoiding air-bubbles, and pressed into perfect contact with it by means of the india-rubber scraper. The picture with the transfer paper attached is now dried carefully, and when dry separates of itself from the temporary support.

Mr. J. R. Sawyer of the Autotype Company has introduced a flexible support, consisting of paper coated with a solution of gelatine rendered insoluble with chrome alum. When dry this is coated again with an alkaline solution of shellac, dried and well rolled under powerful pressure—it is afterwards coated with a waxing compound. The use of this flexible sup-

port is said to be advantageous with small pictures, but I have not found it answer very well in this country.

All these operations, which seem so complicated, are in reality very simple, and as the sensitised tissue is very sensitive to light a great many prints can be produced in a single day. The number may, moreover, be increased by a plan proposed by Capt. Abney, R. E., of exposing the print for only half the usual time and then letting it lie by in the dark for some hours. The decomposing action set up by the light goes on in the darkness, and on development a picture is produced quite as good as if it had received a full amount of exposure and been developed at once. This discovery is largely utilised by those working the process in England, and enables an amount of work to be done in the winter months which would otherwise be impossible.

The single transfer process has been successfully worked at the Surveyor General's Office in Calcutta for the production of photographs of the convicts transported for life to the Andamans. No great difficulties were met with in working it, even in the hot weather, but it was found necessary to ice the solution of bichromate of potash used for sensitising the tissue, and to add a certain proportion of spirits of wine to it, in order to keep the gelatine from softening too much. Messrs. Bourne and Shepherd, the well-known Indian photographers, have made arrangements for working the Autotype process at Simla, the climate of Bombay having been found unsuitable.

The pigment prints are perfectly permanent for all practical purposes, and, though they may under certain circumstances change colour slightly or lose their brilliancy, there is no such absolute fading and loss of details as in silver prints. The process may be applied in all cases to replace silver printing where permanency of results is an object. As I have mentioned before, the process is not quite suitable for the reproduction of coloured or shaded maps, owing to difficulties in obtaining prints comprising large surfaces of clean white paper together with the delicate half tones of hill-shading. For maps in line the simple carbon process is more suitable, or if many copies are required, photozincography would be better.

Anilin Printing.—Before proceeding to the consideration of the processes employed for producing prints in the printing press, mention may be made of an ingenious process of printing which depends upon the use of salts of chromium, and is largely used in Europe for the reproduction of maps and plans. It is known as the 'Anilin printing process' and is the invention of Mr. J. Willis, who has patented it.

Paper is impregnated with a solution of bichromate of potash to which a little phosphoric acid has been added. After exposure to light under a transparent positive, such as a drawing on thin paper or vellum cloth, or even

an ordinary engraving or manuscript, it is exposed in a closed box to the vapour of anilin, which developes a greyish image. The print is then fixed by merely washing with water. As a positive original yields a positive print, maps or drawings may be copied without the necessity of making a negative by means of a camera, which is a great recommendation in certain cases. The process has hitherto been worked only by the inventor and his licensees and has not come into general use.

V. PHOTOLITHOGRAPHY AND PHOTOZINCGRAPHY.

In all the processes noticed in the last section, it is necessary to repeat the printing operation by exposure to light for every print produced. The rate of printing will consequently be more or less dependent on the sensitiveness of the paper, the strength of the light at the time of exposure and the state of the weather; the printing operations can, moreover, only be carried on during the few hours of daylight. In the photo-mechanical processes, now about to be described, these grave disadvantages are obviated, and, once the photographic image has been produced upon the printing surface, prints may be made in any numbers, quite independently of light or weather.

The simplest and most generally useful of these mechanical processes is photolithography, or the analogous photozincography, the principal difference between the latter and the former being merely the substitution of a thin smooth plate of grained zinc for the thick heavy lithographic stone. For maps of large size, zinc is certainly the most suitable and offers in other respects all the advantages of stone, but the latter being better known is generally preferred for ordinary work of moderate size.

In ordinary lithography, the image may be produced on the stone or zinc either by *transfer* from a drawing on paper with the solution of resinous soap known as 'autographic ink', or by *drawing direct* on the stone with a similar ink or crayon; so in photolithography there are two similar methods of obtaining the photographic image—either by transfer from a photographic print in fatty ink—or by impressing the image direct on the stone, by applying a photographic negative on a suitable coating sensitive to light and removing by means of a solvent the parts unaltered by light. The transfer method being the most convenient is the one in general use.

The first photolithographic process on record is that proposed by Jobard, of Brussels, who, in 1839, obtained lithographic proofs from stone or zinc plates that had been treated with iodine or bromine. This process never came into practical use and has been quite superseded by two distinct methods—one dependent on the alterability of asphaltum under the influence of light—the other on the reactions of the alkaline bichromates upon gelatine and other colloid substances.

Asphaltum methods.—In 1852, MM. Lemer cier, Lerebours, Barreswil and Davanne, proposed a method of litho-photography, in which a stone was coated with a solution of bitumen in ether, exposed to light under a reversed negative, and developed with ether, which dissolves the parts not affected by the light, while the exposed parts being insoluble remain and form the image. (Benzole, chloroform or turpentine may also be used instead of ether). After development the stone was prepared with acid and gum and inked in the same way as an ordinary lithographic drawing.*

Since then many other similar asphaltum processes have been proposed and have been worked with great success, both for subjects in line and half-tone; but, owing to the length of exposure required and the uncertainty of the results, this process is not well adapted for general use, and has, I believe, been almost abandoned in favour of the collochromate methods.

Collo-chromate Processes.—Paul Pretsch, whilst working out his photogalvanographic process, hereafter to be described, discovered that if a mixture of gelatine and bichromate of potash be spread upon a suitable support and when dry exposed to light, then again moistened and inked in with a roller charged with printing ink, the ink would only take upon the parts altered by the light, and thus impressions could be obtained by transferring the design to zinc or stone.

Pretsch does not seem to have made any practical use of this discovery, but shortly afterwards, in 1855, Poitevin independently worked out a photolithographic process on the same principle, which has been the foundation of all the present processes of photolithography and photocollotype and is worked to the present day for the reproduction of the Belgian topographical maps. Poitevin impressed his photographic image direct upon the stone and not by transfer.

The first practical *transfer* process of photolithography seems to have been suggested by Asser, of Amsterdam, early in 1859. He coated unsized paper with starch, and then floated it on a strong solution of bichromate of potash. When dry it was exposed to light under a well intensified negative. The print was next heated with a flat iron, then moistened and inked in with transfer ink, by means of a roller, and thus an impression was obtained which could be transferred to stone or zinc.†

The next transfer processes were the Southampton process of photozincography, which was founded on Asser's, and Mr. Osborne's process of photolithography. These two processes, though quite independent one of the other, were identical in principle and almost so in details; the only difference being that Mr. Osborne added a certain proportion of albumen to the mixture of gelatine and bichromate and then treated his prints with boiling water, in

* See Davanne, *Chimie Photographique*, p. 456.

† *Photographic News*, Vol. III, p. 146.

order to conglute the albumen and leave a slight coating of it on the paper, so as to obtain a 'grip' on the stone during the process of transfer.*

At the Ordnance Survey Office, Southampton, and at the various photographic offices in India, in which the process has been introduced from Southampton, photozincography is used, with the best results; but in Australia, America and the Continent of Europe photolithography is more usual and it is also used at Madras.

These processes have occasionally been used with fair success for the reproduction of shaded maps, architectural views and other subjects in half-tones, but they are not by any means suitable for such subjects, and are best adapted for the reproduction of maps and drawings boldly executed in dot or line alone.

They may also be used for copying prints or engravings of all kinds on the same, larger or smaller scales, but engravings, and even many lithographs, are generally more or less unsuitable for the purpose. The best results are obtained from original drawings specially prepared to suit the requirements of photographic reproduction, in strict accordance with the rules already given.

The following outline of the Southampton method will give an idea of the operations. Like the pigment-printing process, already described, it depends upon the property possessed by a dried layer of gelatine and other colloids, when mixed with an alkaline bichromate, of becoming insoluble and repellent of water under the influence of light. The procedure, too, is much the same as in the simple pigment-printing process, except that, instead of the fatty ink which forms the image on the photo-transfer print being mixed with the gelatine, it is applied to the surface of the print after exposure to light. The inked print is then washed in hot water, by which the colloid coating in the unexposed parts is dissolved and carries away with it the superfluous ink not retained by the lines forming the image.

The negatives are obtained by the methods already described applicable to the reproduction of subjects in line.

Having obtained a suitable negative, the next operation is to produce from it a photograph in greasy ink which may be transferred to zinc or stone.

To prepare the sensitive paper, a sheet of bank-post paper is coated twice with a mixture of 6 parts gelatine and 4 parts bichromate of potash, dissolved in 100 parts of water, dried in the dark and glazed to give it a smooth surface. It is then exposed to the light under a negative for one or two minutes in the sun, or until the finest lines are distinctly visible. When sufficiently exposed, which may be ascertained by the whole of the detail appearing in brown upon a bright yellow ground, the print is taken out of

* *Photographic News*, Vol. IV, p. 374.

the printing frame and passed through a lithographic press in contact with a polished stone, or zinc plate, which has been coated with a lithographic transfer ink, and thus receives an even coat of the greasy ink. The inked print is immersed for a few minutes in tepid water, to soften the gelatine still remaining soluble in the parts not acted on by light, and then laid on a sloping glass or metal plate and gently washed with a sponge and warm water till all the unaltered gelatine is removed, carrying the superfluous ink with it. The lines, on which the light has acted, remain insoluble and retain the ink, forming a clear image of the subject in a greasy transfer ink, precisely similar to the ordinary lithographic transfer drawing. When all the details are clearly and sharply defined, and the ground is quite free from ink, the print is rinsed in clean water and dried. It is then ready for transfer to stone or zinc.

It often happens that a map is too large to be photographed in a single section. In this case the transfer prints of the different negatives are carefully joined together with gelatine and transferred to the stone or plate; or if too large to be printed in one sheet, the joined-up transfers may be cut up into as many convenient-sized sections as may be necessary.

Zinc plates possess great advantages over lithographic stones on account of their superior lightness, cheapness, facility for storage and less liability to breakage, and are therefore to be preferred in reproducing plans of large size. For fine work stone is considered by some to give better results than zinc, but I believe that if due care be taken as good prints may be made from zinc as the best from stone.

The plates used for this purpose are about $\frac{3}{8}$ of an inch in thickness, and have one side carefully planed and smoothed; but in order to give a somewhat porous surface to the plate, so that it may be more absorbent of moisture and hold the greasy ink better, the planed side of the plate is grained, or roughened by grinding it evenly all over with very fine sand and water. After the transfers are made, the plate is etched with a preparation of gum and decoction of gall-nuts to which a little phosphoric acid is added.

If the transfers are made to a lithographic stone instead of to a zinc plate, the operations are exactly the same as for transferring an ordinary lithographic transfer-drawing, except that the stone need not be heated. The operations of printing, whether from zinc or from stone, are precisely the same as in ordinary lithography.

Various modifications have been introduced, but the above process is still one of the best and most simple, and, if care be taken with suitable subjects, results may be obtained by it not to be surpassed by any other method. Full details regarding it will be found in Sir H. James' '*Photozincography*,' also in the *Photographic News*, Vol. XII, page

280 *et seq.* The accompanying specimen of a reduction from an old engraved map will give an idea of the results that may be obtained.

In the Southampton process the whole of the unaltered gelatine is removed from the paper, and the objection has been made that, in consequence of this, the ink on the lines being left on ridges of gelatine is more liable to spread in transferring, that the fine lines are liable to be washed away by the dissolution of the gelatine beneath them, and that the prints are liable to slip during transfer. To remedy these defects various methods have been proposed for retaining the gelatine on the paper.

One of the best of these methods has been perfected by Capt. Abney, who has patented it under the name of 'papyrotype.'*

A tough paper is coated with gelatine, and subsequently treated with alum or chrome alum. It then receives a coating of gelatine and bichromate of potash as in the Southampton process. After exposure to light the print is drawn through *cold* water, and is then 'squeegeed' down on to a smooth metal plate, and inked in with a soft gelatine roller charged with transfer ink. The ink 'takes' only on the parts exposed to light, while the ground of the print remains clear. When the image is fully inked up, the print is dried and exposed to light, to harden the gelatine thoroughly by the action of light on the bichromate salt still remaining, and is then ready for transfer to stone or zinc.

Among the advantages claimed for this process, the principal are that—

The ink which forms the lines is not left on ridges of gelatine, as in the Southampton method. The fine lines are not liable to be removed. The surface of the transfer will have no tendency to slip during transfer.

In practice this method was not found to answer in this country so well as the ordinary one, but a modification of the latter has lately been introduced in the Surveyor General's Office, with the same object as the papyrotype, and seems to answer well.

The paper is prepared as usual with two coats of gelatine and bichromate of potash. It is then put away for a few days, in order to allow the gelatine to become hard and insoluble. When required for use, it is coated again with a mixture of gelatine and bichromate of potash of about one-third the usual strength, and is then exposed to light and inked in the usual way. The washing is done with cold water instead of with hot.

Instead of allowing the gelatine to harden by keeping, which takes from 3 to 12 or 14 days according to the season, the hardening action may be hastened by laying the sensitive paper face downwards on a board, and allowing the light to act on the back surface for a minute or two. This may be done, either after the print has been obtained from the negative, or just

* 'Instruction in Photography,' p. 155.

after the preliminary coating has been given to the paper. The gelatine may also be hardened with alum or chrome alum.

It has been found that this method has the advantage that a base of hard insoluble gelatine remains on the paper and retains the finest lines, while the fresh and easily soluble final coating preserves the clearness of the ground. It is necessary that the underlying gelatine should be thoroughly hardened, otherwise the transfers stick to the zinc plate in transferring, and are difficult to remove; the soft gelatine is also liable to spread over the lines and prevent their transfer.

Another advantage is that warm water is not required for washing the prints, and the ink is not so liable to become pasty as in the usual mode of working. The lines are found to keep crisp and the spaces between them free from scum, thus giving clearer and sharper transfers.

Mr. Herbert Deveril, Government photolithographer in New Zealand, found that, in working Osborne's original process of photolithography, which is still generally used in the Australian Colonies, great inconvenience arose from the use of boiling water to coagulate the albumen added by Mr. Osborne to the gelatine in order to produce an insoluble surface with a 'grip' on the stone. He has therefore substituted the following method of producing his transfer prints. Paper is first coated with gelatine to which a small proportion of chrome alum has been added. This is allowed to dry and is then sensitised in a solution of bichromate of potash. The prints are exposed and inked as in the Southampton process, and are washed off in cold water.* Mr. Deveril claims for this method the further advantage that the sensitive paper can be kept in good condition for a long time. The keeping properties of papers coated with gelatine and bichromate are, however, very dependent on climatic conditions. The results which I have seen by the process are exceedingly good.

A method of photolithography by transfer which yields excellent results in line, and even reproduces half-tones fairly well, is a modification of Asser's process, invented by Mr. Toovey, of Brussels, who coats paper with a solution of gum arabic mixed with bichromate of potash, and after exposure to light under the negative in the usual way, places the transfer-print face downwards on the stone with several thicknesses of wet blotting paper over it, and leaves it under pressure for some hours in a powerful press.

The gum on the parts not exposed to light being soluble is forced into the stone and prepares it, while the lines being hardened and rendered insoluble leave the stone quite free from gum and ready to take printing ink from a roller when passed over them, thus producing an image which may be printed from as soon as the soluble bichromate salt has been washed out, because the bichromated gum is a most powerful preparation for the stone

* '*Photographic News*,' Vol. XIX, p. 585.

and, indeed, is difficult to remove without grinding the stone down to some depth.

This process requires care in adjusting the amount of moisture to be applied to soften the gum, so that it may not be squeezed under the lines and block them up, and it has not, I believe, come into general use.

There are two disadvantages which militate against the employment of the transfer processes of photolithography for the finer and better class of maps. The first, is the difficulty of obtaining reproductions perfectly true to scale, owing to the unequal expansion of the transfer paper in the various washings and squeezings it has to undergo. Although this unequal expansion and contraction is very slight, and for most practical purposes may be disregarded, it has greatly hindered the more universal adoption of this valuable method for the reproduction of the official maps in England and foreign countries.

Mr. Rodriguez, of Lisbon, has, however, lately introduced an improvement into the transfer process with the object of doing away with the possibility of stretching in the course of any of the operations.* Instead of using paper as the support of the coating of gelatine on which the photographic image is impressed, he uses a sheet of tinfoil about the thickness of thin paper. This is first smoothed on a very finely grained lithographic stone and then laid down quite flat on a sheet of zinc. After being cleaned with alkali and well washed, the tinfoil is brushed over with a solution of gelatine and bichromate, dried rapidly, and is then ready to be exposed under a negative in the usual manner. To ink the print, the sheet of tin is first plunged into water, and then carefully laid down wet on a lithographic stone so as to avoid folds, the gelatine side being uppermost. The film is then inked in with a roller. After the first inking in the print is left for about a couple of hours and is then inked in again and afterwards washed with a sponge and water. It may then be lifted off the stone and dried. The operations of transfer are the same as usual.

The second disadvantage of the transfer methods is the almost unavoidable spreading of the lines under the operation of transferring, which makes a photolithographed map look heavy and unsightly compared with a lithographed one. This defect may, however, be diminished very much by skilful manipulation and taking care to have as thin a coating as possible of gelatine on the paper, and to use a good hard transfer ink in small quantity. With these precautions and with a suitable original, results may be obtained from photolithographic transfers which will well compare with ordinary lithography, or even engraving, in sharpness and delicacy.

These special defects of the transfer methods may be in great part obviated by impressing the photographic image direct on the stone, as origi-

* *British Journal of Photography*, Vol. XXV, p. 232.

nally proposed by Poitevin, but this plan has again other disadvantages of its own which render it less suitable for map work than the transfer process. It has, however, been used extensively, and very successfully, in the production of the Belgian topographical maps on the scale of 1 : 20,000.

In the process used for the Belgian maps, the stone is covered with a very thin coating of a mixture of gelatine and bichromate of potash, rapidly dried and exposed to light under a reversed negative, which is obtained by reversing the position of a dry tannin plate in the camera and allowing the light to act through the glass on the underside of the collodion film. A thin coating of printing ink is then applied all over the stone with a roller, and the surface is afterwards washed with warm water in which a little starch has been dissolved. This gradually removes all the soluble parts of the gelatine coating, leaving on the stone a clear image of the map. The stone is then covered with gum and after drying and remaining for a short time is ready for printing and capable of yielding 1500 good impressions.*

For line-work zinc plates are also used and prepared in much the same way.

This process has undoubtedly some advantages as regards accuracy of scale, and the quickness and cheapness of the operations, but on the other hand it has disadvantages as regards the difficulty of securing perfect contact between the stone and the negatives, the necessity for a reversed negative, the prints being limited within a single negative and the inconveniences of working with heavy stones.

Besides the foregoing, many methods of photolithography have been proposed, but as for the most part they are only modifications of the processes I have described, which are all good and may be considered typical, it will be unnecessary for me to go further into details regarding them.

VI. PHOTOCOLLOTYPE.

The great defect of all the processes of photolithography described in the last section is, that they can only be applied with advantage to the reproduction of drawings or subjects in which the gradation of shade is shown by lines or dots separated by white spaces of varying sizes and at different intervals apart, as in line or stipple engravings and lithographs in line or chalk. Even such drawings to be successfully reproduced must be in a good bold open style and have all the lines or points composing them of an equal and perfect blackness. In the many attempts that have been made to reproduce photographs from nature by photolithography or photo-engraving, or to copy paintings and brush-shaded drawings in which gradation of shade is continuous, success, only partial at best, has been secured by

* Maës and Hannot's '*Traité de Topographie, et de Reproduction des Cartes au moyen de la Photographie*'; also Hannot's '*La Photographie dans les Armées*.'

breaking up and destroying the continuity of gradation. By the processes of photocollotype, so called from the printing surface being of gelatine, these defects are entirely obviated, and absolutely permanent photographic prints may be produced in the printing press equal to silver prints in perfect delineation of detail and delicate gradation of shade, but vastly superior to them in permanence and cheapness of production.

Poitevin was the first to recognise, so early as 1855, the fact that the half-tones were better preserved on stones that had been treated with a chromated colloid mixture if, after exposure to light under a negative, instead of being inked all over and then washed with water to remove the superfluous ink, they were first moistened and then inked in with a lithographic roller charged with printing ink*. He seems, however, to have always regarded the stone as the principal printing surface and treated it by the ordinary methods of lithography. Only a few impressions could be obtained from stones thus treated.

In 1866, Messrs. Tessié du Mothay and Marechal, of Metz, discovered that the stone or metal plate hitherto used as a printing surface might be replaced by a mixture of isinglass, gelatine and gum, treated with an acid chromate, and evenly spread upon a well polished metal surface; because if, after exposure to light under a photographic negative, such a gelatinous surface were moistened, greasy ink applied upon it with a roller would adhere well to the parts of it that had been acted upon by light, and would be taken up by those parts in proportionate quantities, according to the intensity of the gradations of light and shade produced on them by the action of light, and their consequent impermeability to water. Photographic prints in fatty ink reproducing the most delicate gradations of shade without any apparent grain or break of continuity could thus be produced.†

It will be seen that this process was based on exactly the same principle as Poitevin's photolithography, but differed from it in the distinct recognition of the colloid film as the printing surface. Messrs. Tessié de Mothay and Marechal were also the first to recognise the necessity of adding a certain proportion of acid or of oxydising or reducing agents to the chromate salt used for sensitising the gelatine, with the object of rendering the colloid surface more apt to receive the greasy ink and also of hardening the film so as to enable it to withstand the wear and tear of printing. This they did by exposing the sensitive plates to a high temperature before using, but the effect was produced in great measure by the decomposition of the chromate salts by the acids or other substances added to the colloid mixture.

Messrs. Tessié du Mothay and Marechal printed off their 'phototype' plates in a lithographic press in much the same way as ordinary lithographs,

* *Traité de l'impression photographique sans sels d'argent*, p. 78.

† *Photographic News*, Vol. XI, p. 260.

but with certain modifications due to the peculiar nature of the printing surface. The principal of these was the use of two inks, one stiff, for giving force to the shadows, the other thin, for bringing out the more delicate half tones.

The 'phototype' process as at first proposed laboured under the defect of not being able to yield a large number of prints from a single plate, but, in 1869, it was improved upon in this respect by Albert, of Munich, who substituted a thick glass plate for the metal plate used by Tessié du Mothay and Marechal as a support for the colloid film. His films consisted of albumen, gelatine and bichromate of potash alone, and he gave them the required solidity and adherence to the glass by first coating the plate with a sensitive colloid mixture containing a large proportion of albumen, and then giving the under side of this first coating a preliminary exposure to light through the glass. The second coating containing more gelatine was then applied, and after it had dried, and the photographic image had been impressed upon it, the plate was again exposed from the back, in order to thoroughly solidify and combine the under part of the compound film. The gelatine films so prepared were capable of yielding some hundreds, or even, it is said, thousands of perfect copies. This process is still largely used by its inventor and is known by the name of Albert-type.*

According to some authorities, Messrs. Ohm, Grossmann and Gemoser, of Berlin, took out a patent, in 1867, for a method of photocollographic printing comprising, in addition to the use of glass as the support of the gelatine film, of the double coating of the plate and of the hardening of the film by exposure of the back surface, the introduction into the sensitive gelatine mixture of certain resinous compounds dissolved in spirit, by which the gelatine film is rendered quite insoluble and admirably adapted to form a fine printing surface. It is said on the other hand that the credit of all these improvements is due to Albert; but, in any case, it is certain that until after the publication of Albert's process early in 1869, Ohm and Grossmann's was almost unknown and had not come into general use. In October 1869, the Autotype Company in London acquired the patent, and have since worked the process with the greatest success.

About a year after the publication of Albert's method, Mr. Ernest Edwards, of London, introduced, under the name of 'Heliotype,' a very important modification of the photocollotype process.

He first waxed a glass plate and then coated it with a substantial layer of gelatine and bichromate of potash, containing a small quantity of chrome alum, with the object of hardening the gelatine and rendering it insoluble, without destroying its impermeability to water. When dry, the gelatine

* '*Photographic News*,' Vol. XIII, p. 121.

film was removed from the waxed glass plate, and the side which had been next to the glass was exposed under a reversed negative in the usual way, and, then, as in Albert's process, the back surface of the film was hardened by exposure to light. After this, the film was attached under water to a metal plate, preferably pewter, coated with india-rubber, and 'squeegeed' into perfect contact with it. The bichromate salt was then removed by washing and the plate was ready to be printed in an ordinary Albion printing press.

In this process the peculiarities were the use of chrome alum for hardening the gelatine; the separation of the colloid film from its original support, by which perfect contact with the negative was secured, as well as less risk of breakage of the latter; the subsequent transference of the film to a metal plate, by which the liability to breakage of glass plates in the progress of printing was obviated, and, lastly, the substitution of vertical instead of a scraping pressure in printing, by which the gelatine films were not exposed to injury by wear and scraping of the surface.

This process is still, I believe, largely practised and full details of it, with various improvements suggested by Capt Abney, R. E., will be found in the latter's excellent little work—"*Instruction in Photography.*"

About the same time, Herr Obernetter, of Munich, proposed another process of the same kind offering some peculiarities, and said to produce very satisfactory results.

A sheet of glass is coated with a mixture of gelatine, albumen, sugar and bichromate of potash, dried and exposed to light under a negative. The plate is then dusted over with finely powdered zinc, which attaches itself only to the parts protected from the light and in proportion to the amount of protection they have received. The plate is then heated to about 369° F., or exposed to light till the whole surface of the film has been rendered insoluble. Before printing, the plates are treated with dilute muriatic or sulphuric acid. By this operation the parts of the gelatine film covered with zinc, are rendered, by the formation of hydrogen, susceptible of attracting water to a greater or less degree, while the other portions, upon which no zinc has settled, are capable of receiving a fatty ink. The printing is then proceeded with in the usual manner.*

Since 1869, when these processes first began to come into practical use, many methods of working have been introduced, chiefly in Germany and France, but so far as known they are nearly all of them more or less modifications of one or other of the above, merely differing in the manner of preparing and hardening the gelatine film. A good deal of information on the subject will be found in Husnik's "*Gesammtgebiet des Lichtdrucks,*" Geymet's "*Phototypie,*" Moock's "*Traité pratique d'impressions photo-*

* '*Photographic News,*' Vol. XIII, p. 483.

graphiques aux encres grasses," and A. Martin's "*Handbuch der Emailphotographie und der Phototypie oder des Lichtdruckes.*"

The great difference between the photocollotype processes and lithography is, that whereas the lithographic stone receives a like quantity of ink in all parts of the image, and is incapable of producing a true and continuous gradation of shade, the moist gelatine film possesses the valuable property, not possessed by the stone, of receiving a greater or less amount of ink in different parts of the image, in exact proportion to the intensity of the action of the light upon them, and is thus capable of reproducing the most delicate gradations of shade as perfectly as they are shown in an ordinary silver print.

It will thus be readily understood that instead of the advantages of photographic reproduction by cheap and speedy mechanical processes being confined to the reproduction of certain special subjects, they can be extended to all classes of subjects, such as photographs from nature, brush-shaded and coloured maps, MS. records, drawings and paintings of all kinds. Even for line subjects, the process surpasses most of the known processes of photo-engraving, photozincography or photolithography in the delicacy, sharpness and clearness with which the finest lines can be reproduced, as well as in perfect accuracy of scale, owing to there being no intermediate process of transfer, with its attendant washings and pressings, and the plate being printed by vertical pressure.

The process has the further advantage that the prints do not require mounting, and this makes it very suitable for book illustration, for which, indeed, it is now being very largely used. It is especially valuable for illustrations of a scientific character in cases where otherwise only the highest class of lithography or engraving would be applicable and at an enormously increased expense.

For the most successful application of the photocollotype processes to the reproduction of maps, the result depends, as in photozincography, very much on the quality of the negative, and that again on the original.

Any negative that will give a good photographic print will answer, but the successful reproduction of shaded maps or drawings demands considerable care in the execution of the original drawing as well as in taking the negative. The precautions to be taken in these respects have already been indicated in sections II and III.

For some years past my attention has been given to the utilisation of this valuable process for the reproduction of maps and other photographic work which the Surveyor General's Office is called upon to do for various Government departments. In the Proceedings of the Society for November 1871, I described a process which I had found to answer well for line work, and strenuous efforts were made to bring this and other methods into prac-

tical working. It is much to be regretted that owing to the many difficulties met with in manipulating the gelatine films in the hot damp climate of Calcutta, and in getting printers with the special artistic skill required to produce the best results, our efforts have not been quite successful, and, as photozincography is found more convenient for most of the work passing through the office, the photocollotype process has not been brought into general use.

As the process previously described in the Proceedings has since then been modified and is, I know, exceedingly good for line work, the following description of the manipulations, extracted from the Annual Reports of the Surveyor General's Office for 1871-72 and 1872-73, may prove of interest, especially as the working details of few of the other processes have been published.

The printing plates are of plate glass, about $\frac{3}{4}$ or half an inch in thickness, evenly ground on one side with fine sand. When required for use they are thoroughly cleaned to remove all grease, and then carefully levelled.

The composition of the gelatine coating is as follows :—

A.	{	Gelatine,.....	1 ounce.
		Glycerine,	1 dram.
		Distilled water,	6 ounces.
B.	{	Albumen,*	1 ounce.
		Distilled water,	1 ounce.
C.	{	Tannin,	10 grains.
		Water, (in hot weather, Spirits of wine,)...	1 ounce.

The above quantity will be sufficient for two square feet of plate.

As soon as the gelatine in solution A is quite dissolved, B is added and then C is poured in gradually with constant stirring. The whole is strained through two thicknesses of cotton cloth and poured evenly over the plates on the ground side, any air bubbles being carefully removed. The plates are then covered over with a light paper cover, to prevent dust falling on them, until they are *set*, when they may be removed into the open air and turned face downwards to dry. Or they may be dried with gentle heat in a drying box, but too quick drying is to be avoided because the gelatine films will dry unevenly.

When the plates are dry, they may be put away till required or sensitised in a bath of—

Bichromate of Potash,.....	1 part.
Water,	20 parts.

They are allowed to remain in this for 5 minutes, then removed to a drying box and dried with a gentle heat. When dry, the deposit at the back of the plates, and any inequalities at the corners of the gelatine film are

* 30 grains of carbolic soap may be used instead of the albumen.

removed, and the plates are ready for exposure under the negative, which must be a reversed one obtained as described in section III.

If the reversed negative has been taken direct on glass, the exposure to light is performed in a pressure frame, in the same way as for ordinary photographs. It is advisable, however, to secure clean margins by shielding the borders of the negative by means of a mask, cut out in yellow or brown paper, which should well overlap the edges of the printing plates. The sensitive plate may be rubbed over with a little powdered soapstone to prevent any adherence to the negative. Some sheets of dark-coloured paper or cloth should be placed behind the sensitive plate and then a thick sheet of glass to give a good even pressure.

If, however, the negative has been stripped from the glass and is in the form of a thin skin, the most perfect contact will be produced by transferring the negative on to the surface of the printing film, in such a manner that it may be removed again after the exposure.

This operation presents some difficulties, but I have found the following method answer well. The sensitised and dried gelatine surface of the printing plate is covered with a very thin even coating of wax dissolved in turpentine or benzole. The plate is then placed in a dish containing sufficient spirits of wine to cover it. The thin negative film is laid down upon the gelatine in its proper position, the plate and film are then removed from the spirit, and the negative film carefully squeegeed into close contact with the gelatine surface. The plate is then covered with a few thicknesses of blotting paper, under a thick glass plate, and allowed to dry. When dry, the plate is ready for exposure. After exposure, the negative film is removed from the gelatine surface; and, if sufficient wax was used and the film is fairly tough, it comes away without tearing. Should it tear, it should at once be dissolved off with ether, or there will be a continuing action of light on the parts of the gelatine surface protected by the negative film, so that they will print darker than the rest of the plate. Before printing, the wax should be removed from the gelatine with turpentine. The object of effecting the transfer in a bath of spirits of wine is, that neither the gelatine, wax, bichromate of potash or negative film are in any way affected by it.

The duration of the exposure to light varies from 10 minutes in the sun for a clear line subject, to from 25 to 50 minutes for a subject in half tones, according to the density of the negative and the intensity of the light. It is almost impossible to judge of the progress of the printing by inspection, and it is necessary to use an *actinometer* as a guide to the exposure. The following form of actinometer has been found to answer well for the purpose. It consists principally of a box, in the lid of which is fixed a translucent scale divided in 14 squares of different densities, No. 1 being

almost transparent, while No. 14 is almost quite opaque; and numbers corresponding to the densities are painted in opaque colour on the scale. The scale is made by taking a collodion negative of a drawing shaded in tints of different strengths, and should be intensified so as to correspond in density with the kind of negatives it is intended to be used with.

The body of the box contains a block for carrying the sensitive surface, which may be spread on paper or on a glass plate, and a strip of vulcanised rubber below it presses the block into close contact with the scale.

I prefer to use in the actinometer a sensitive film of the same composition as the printing plate; small slips of glass are therefore coated with the gelatine mixture, sensitised, dried and exposed to light at the same time and in the same manner as the printing plates, and thus the progress of the action of light can be watched and timed very closely.

When the exposure to light is considered sufficient, the printing plate is removed from the pressure-frame and laid, gelatine side downwards, on a board covered with black cloth. The back, or under surface, of the gelatine is then exposed to light, for about 10 minutes, to thoroughly harden the gelatine and prevent it from swelling too much in the after processes. It is well to conduct this second exposure under a piece of ground glass, in order to prevent any scratches that may be on the back of the glass from showing as white lines in the print. The edges of the plate are then protected by strips of paper coated with solution of india-rubber, and when the india-rubber is dry, the plate is soaked in water until all the soluble bichromate has been removed, and is then ready for printing.

The plates can be printed in a lithographic press, but then they require to be fixed on a level stone with plaster of Paris. It has been found, however, more convenient, and in some respects better, to print them with vertical pressure in an ordinary Albion platen press; and in order to prevent the glass being broken, the bed of the press is fitted with two or three thicknesses of kamptulicon, besides a sheet of vulcanised india-rubber on which the plate rests. It is also desirable to place a piece of white paper over the bedding in order to enable the state of the plate when it is being inked up, to be better seen.

The inking in requires great skill and care on the part of the printer and is the most difficult part of the whole operation. The plate having been well soaked in water is laid on the press, and after being wiped to remove the excess of moisture, is inked in, if a line subject, with an ordinary lithographic roller charged with an ink composed of lithographic chalk ink thinned with a little olive oil, followed by rolling with a smooth roller to clear away the superfluous ink; a mask of the required size is laid on the plate to preserve the margins clean; over this comes the printing paper covered with a piece of soft felt, to drive the paper well into the hollows of

the plate; the tympan is lowered and the impression pulled in the ordinary way. The plate is then damped and inked in again, and so on.

Half-tone subjects are treated in the same manner, but it is sometimes advisable to use two kinds of ink of different consistence or depth of colour; a stiff or dark ink gives force to the shadows, while a thin or lighter coloured one will bring out the delicate half-tones. Rollers made of gelatine, glycerine and castor-oil may be used with advantage, as they drive the ink better into the hollows of the lines than the leather rollers. Capt. Abney, who has given great attention to these processes, says that the great secret of producing good results is to have the command of first rate rollers. Glazed enamelled paper is generally used for printing half-tone subjects, but in some cases unenamelled paper answers well. The most suitable paper for printing seems to depend partly on the composition of the sensitive surface and partly on the ink.

One of the great drawbacks to the extended use of the photocollotype process for the reproduction of maps is the difficulty of making corrections on the plates. When the printing surface is a metal plate or lithographic stone, upon which a map has been either engraved, zincographed or lithographed, additions and erasures may easily be made without any risk of the loss of the printing surface or even of much damage to it. With the tender gelatine films the case is different, and although writing or simple lines may be inserted without much difficulty, it would be almost impossible to successfully alter gradation of shade or to insert shaded details. On the other hand, the taking out of details must be done by some chemical means which must always be attended with the imminent risk of raising the gelatine film from its support and the consequent utter destruction of the printing plate.

As maps, almost more than any other printed subject, require that it shall always be possible to make corrections on the printing plates, it is obvious that the use of any process which will not permit of this being done must be confined more to the reproduction of maps already printed or of an ephemeral character than to the preparation of new or standard ones. And thus, though photocollotype is admirably adapted for reproducing copies of old or other special maps, which are, or can be, finished once and for all, it is not suited for maps on which corrections are likely to be required.

With the plates prepared as described we have found that details may be inserted by two or three methods. The first is by writing in the required additions on the dry gelatine surface, using an ink composed of bichromate of potash, either alone or coloured with Indian ink. After the insertion of the additions the plate is exposed to the light for a few minutes to reduce the bichromate, and may then be washed and printed as usual.

Or an ink composed of solution of chrome alum may be used and will not require exposure to light. In some cases the part to be corrected may be washed over with a solution of bichromate of potash and allowed to dry, and then the required details may be printed in from another negative.

The taking out of details is more difficult and requires care. It may be accomplished by washing the part with a strongish solution of caustic potash or cyanide of potassium. Should a plate print dirty, it may be cleaned up and greatly improved by being washed with a weak solution of cyanide of potassium, or better, with a solution of citric acid, which not only clears up plates that print dirty, but at the same time facilitates the inking in. A weak solution of ammonia is also said to be useful in this respect.

The process just described was found to answer better in Calcutta for line-work than for half-tones, and for the latter the following formula for the gelatine films appeared preferable :—

Gelatine,	1½ ounce.
Glycerine,	1½ dram.
Albumen,	1 ounce.
Bichromate of Potash,	40 grains.
Chrome Alum,	7 grains.
Water,	12 ounces.

The plates coated with this mixture have to be dried in the dark, but in other respects the operations are much the same.

The processes in which a thick film of gelatine is spread upon a glass plate were found to present in Calcutta many inconveniences in the drying of the films, and the tendency there is in dry weather for the films to peel away from the glass plates and utterly break up and destroy the surface of the latter. There is also the constant risk of breaking the plates in the press. I was therefore led to go back to the old process of Tessié du Mothay and Marechal, in which a thin film of gelatine is supported upon a metal plate, and finally succeeded very well with the following method which I have fully described in the '*Year Book of Photography*' for 1877.

A flat plate of copper, such as used for engraving, is finely grained on its best side, and having been carefully levelled, is washed with warm water and coated on the grained side, while wet, with a mixture composed of—

Gelatine (Nelson's opaque),	15 parts.
Water,	100 „
Bichromate of Potash,	4 „
Formic acid (when the former are dissolved),	4 „

The excess is poured off, so as to leave enough to give a thin even coating. Half an ounce of gelatine is more than sufficient to cover 450 square inches of plate.

The plate is then replaced in the drying box and when dry is ready for exposure to light in the usual way; but it will be found desirable, in order to secure perfect contact, to transfer the negative film on to the gelatine surface in a bath of alcohol as before described.

Formic acid varies in strength and other properties, and if it should be found that the films made by the above formula are too soft, the plates may be kept a few days before printing. The addition of a very small quantity of tartaric acid (about $\frac{1}{30}$ of a part) will improve the films in this respect, and so will the cautious addition of some hardening agent, such as chrome alum, glycerine, glucose, honey, &c.

The printing operations are the same as for the plates already described, but the use of glue rollers and vertical pressure will be found advantageous. The thin films have been found to stand the wear and tear of printing well and to have no tendency to chip or tear away from the plates.

In all cases where the photographic image is impressed directly on the printing surface, a reversed negative must be used, as before explained, and these are sometimes rather troublesome to produce. I have lately tried whether the use of this reversed negative could not be dispensed with in the photocollotype process, by taking the negative in the usual way direct on to the thick ground glass plate and then, while still wet and without varnishing, coating this negative with a thin layer of any of the foregoing mixtures of gelatine, either with or without bichromate. When the sensitive gelatine coating is dry, it is exposed to light through the negative on the under side and allowed to print well through the film. This plan was found to have many conveniences to recommend it, and to answer very well for subjects in line, but not for half-tones. For map-work it has the undoubted advantages of perfect accuracy of scale and the greatest possible sharpness of the image.

The foregoing descriptions will give an idea of these interesting processes which are now being very largely used for producing photographic prints of all kinds, though, I believe, the successful working of them still presents some difficulties, even in better climates than India. Against their employment for map-work on the large scale there will, however, always remain the impossibility of joining up several sections of a large map on the printing surface, the difficulty of reproducing the finest tints of a shaded map with a perfectly clean white ground, and, above all, the difficulty of making additions and corrections on the plates.

The accompanying specimen of a reproduction of an old map of Bengal will give an idea of what may be done by the process described at page 93.

VII. WOODBURY-TYPE.

We have already seen that the great drawback to the production of photographs in printing ink with continuous gradation of shade, by either photography or photo-engraving, is the necessity for breaking up the continuity of gradation by a more or less marked 'grain', and that this difficulty has been overcome by the photocollotype processes.

By a very ingenious process, invented in 1864, Mr. Walter Woodbury succeeded in solving the problem in another way, and, by a mode of operation analogous to 'Nature-Printing', has been able to produce absolutely permanent prints with such perfect photographic gradation, combined with the most exquisite transparent delicacy and richness of tone, that none but the initiated would know that they were not the ordinary silver prints.

A tissue is first made by coating a tough film of collodion with a moderately thick even layer of gelatine and bichromate of potash, slightly coloured in order to see the progress of the development. When dry, the tissue is laid collodion side next to the negative film, and exposed to light proceeding from one direction only, in order to prevent diffused rays acting through the thick gelatine coating and so blurring the image. This tissue of gelatine and collodion is then temporarily attached to a glass plate and treated with hot water, very much in the same way as in the pigment printing process already described. The whole of the gelatine upon which the light has not acted, and which therefore remains soluble, is dissolved away, leaving an image in relief, the highest parts of which represent the deepest shadows of the picture, while the parts intervening, down to the lowest, represent the intermediate gradations between the deepest shadows and the highest lights.

When dry, the gelatine composing this image will be quite hard and capable of resisting the heavy pressure required to indent it into soft metal, without itself being injured.

The tissue bearing the image having been stripped from the temporary support, is laid face downwards on a sheet or block of lead or type-metal, about $\frac{1}{8}$ of an inch thick, between two finely surfaced steel plates and submitted to the pressure of a very powerful hydraulic press. The prominent parts of the relief are thus forced into the soft metal and produce a mould the deeper parts of which represent the shades and the shallower the lights of the picture. As the relief obtained from gelatine and bichromate of potash alone will impart to this mould a smooth surface without grain, such plates could not be printed with printers' ink, like a copper-plate engraving. Mr. Woodbury therefore uses a semi-transparent ink consisting of gelatine coloured with any suitable pigment.

The leaden plate or mould is laid in a suitable press of peculiar construction* and slightly greased. A small quantity of the coloured gelatine having been poured in a liquid state into the middle of the mould, a piece of suitable paper is laid above it and pressed strongly down, so as to force the ink thoroughly into the depressions all over the plate and squeeze out all the ink between the surface of the metal and the paper in the parts forming the highest lights of the picture. The gelatinous ink is allowed a short time to 'set' and attach itself to the paper; the paper is then removed and brings with it a perfect impression of the picture in coloured gelatine, of different thicknesses corresponding in intensity and gradation of shade to the depth in different parts of the plate. The print has now only to be 'fixed' in a solution of alum and when dry is perfectly permanent and ready to be trimmed and mounted.

The rate of impression is about the same as of ordinary copper-plate printing and may be carried on quite independently of the light. If very large numbers are required of a single subject, it is easy to produce as many printing plates as may be required from the original gelatine relief, which may afterwards be put away and kept indefinitely. The cost of printing is exceedingly small and prints are produced in large numbers at a marvelously cheap rate. As the process requires special mechanical appliances and apparatus it has generally been worked on the large scale by public companies.

The Woodbury-type is unfortunately not well adapted for the reproduction of maps, because it has been found very difficult to produce impressions of large dimensions, and, owing to the peculiar method of printing, it is almost impossible to obtain the clear black lines and pure white ground so indispensable in a good map. The prints also have to be mounted, which is an objection. However, in special cases where the work is within the capabilities of the process, it will be found valuable, because it possesses the great advantage over the collotype processes for the reproduction of half-tone subjects that the printing of an almost indefinite number of copies can be carried on with as perfect certainty as in ordinary lithography or engraving, while in beauty, transparency and delicacy of gradation the Woodbury-type prints are undoubtedly superior to collotypes.

VIII. PHOTOGRAPHIC ENGRAVING.

As was noticed in the Introduction, the earliest practical process of photography was a method of photographic engraving invented by Nicéphore Niepce, and since his time nearly every great improvement in photography has been applied to this object. Thus, no sooner was the Daguerreotype invented than essays were made by Fizeau, Donné and others to engrave

* For a drawing of this press, see Abney's *Treatise on Photography*, p. 175.

the images produced on the metal plates. In like manner, the earliest application of the peculiar action of the alkaline bichromates upon colloid substances was Fox Talbot's photoglyphic process, which was soon followed by the photo-galvanographic and helioplatic processes of Pretsch and Poitevin. Engraving processes have also been based upon Swan's pigment-printing process, the Woodbury-type and the collotype. With the exception, perhaps, of the second, all these methods, from the earliest to the latest, are in use at the present time in a more or less modified form.

The object of engraving maps upon copper is to obtain a plate taking but little storage room and not liable to break, which shall yield a large number of impressions of uniform quality and, with due precautions, be capable of being preserved in a good condition for printing during any length of time.

Copper-plates have the further advantage that they may be multiplied to any extent by electrotyping, and corrections may be made when required, either on the original plate or on the electrotyped matrix or copy. Transfers may also be made from them to stone or zinc and printed in the same way as ordinary lithographs. This procedure is specially applicable when very large numbers are required or when the subject is to be printed in colours.

Besides these more practical advantages, the superior beauty and finish of copper-plate engraving give it the preference for all maps of a permanent or standard character.

With these objects in view nearly every civilised nation has at least one engraved map giving the results of the State Surveys on a convenient scale for general use. For the same reasons map-publishers generally engrave the maps composing their atlases and other standard publications.

Notwithstanding its many advantages copper-plate engraving is a very slow process and is also expensive, because the art of the engraver is one requiring great artistic and manipulative skill, only to be fully acquired by an almost life-long apprenticeship. Map-engraving, it is true, does not require so high a degree of artistic skill as line or aquatint engraving, but it nevertheless requires a long training, particularly in the more difficult branch of hill-etching which demands almost as much skill to produce first-rate results as ordinary line-engraving.

Although the advantages of photographic engraving as a means of avoiding the long and costly labour of engraving maps by hand are obvious, for various reasons these processes have not yet come into general use. A successful commencement has, however, been made by the Italian and Austrian Governments of employing photography in the production of their engraved maps, and there is little doubt that before long, photographic engraving will be more extensively used for this purpose than it is at present, especially as processes are now available by which gradation of shade

may be obtained without difficulty, and the expensive hand-work of the engraver in biting in or finishing may to a great extent be dispensed with.

The processes of photographic engraving that have been proposed from time to time for producing incised images on metal plates capable of being printed in the copper-plate press, are very numerous. I shall, however, confine myself to those which have been most successfully worked and of which the details have been more or less fully published. Further information on the subject will be found in the special works referred to in the footnotes, and also in Hammann's "*Des Arts Graphiques destinés à multiplier par l'Impression*" and A. Martin's "*Handbuch der Emailphotographie und der Phototypie oder des Lichtdruckes*," which both give very complete resumé of the early progress in this branch of photography, with details of many of the processes. The Photographic Journals and the Patent Office records may also be consulted.

The principal methods of obtaining an incised image on a metal plate by means of photography are :

1. Obtaining a photographic image on a metal plate coated with asphaltum and then etching or 'biting in' with acid.
2. Obtaining a photographic image in gelatine on a metal plate and etching the latter with some substance that will not attack the gelatine.
3. Obtaining an image by the direct action of light on a metal plate, as in the Daguerreotype process, then forming a metallic reserve to protect either the lights or shadows of the image and etching with a suitable mordant.
4. Electrotyping from a relief obtained by the swelling or partial solution of a chromated gelatine film, either directly or by the intervention of a cast in wax or plaster.
5. Electrotyping from a relief in insoluble gelatine obtained in the same way as in the 'Autotype' or Pigment-printing process.
6. Electrotyping from a leaden plate on which an image has been impressed from a gelatine relief, as in the Woodbury-type process.
7. Electrotyping from a relief obtained directly on a collodion positive cliché.

It will be seen that these methods divide themselves into two principal groups of etching and electrotyping processes.

Etching processes with Asphaltum.—We have already seen that Niepce in his experiments to find a substitute for lithography, made use of the property possessed by bitumen of Judæa, or asphaltum, of becoming insoluble in oil of lavender and other solvents, after exposure to the action of light, to obtain photographic images on metal plates which were then bitten in with acid, so as to form engraved plates, usually copies of engravings, though he also obtained images from nature.

Owing to the imperfection of photographic appliances in those early days of the art, the results obtained by Niepce could not have been very satisfactory, but with better appliances the same process has yielded in the hands of Niepce de St. Victor, the nephew of the inventor, Amand Durand and others, results which prove its practicability, and its capabilities for reproducing images direct from nature or for copying fine line engravings and similar subjects, for which latter it is much better adapted.*

A process on this principle has been very successfully used at the Imperial State-Printing Office, Berlin, for the engraving of plates for bank notes and other purposes, and I have also tried it myself with fair success.

The following outline will give an idea of the operations.†

A perfectly smooth copper plate, having been thoroughly cleaned and polished, is coated with a solution of asphaltum in turpentine, to which a little oil of lemon is added. It is then carefully dried in the dark so as to preserve an even coating, free from dust.

The image may be impressed upon the sensitive surface by sun-printing through an ordinary negative on glass, but as there is by this plan great risk of losing perfect sharpness by want of close contact between the glass and the copper plate, it is better to remove the collodion film from the negative and transfer it on to the surface of the asphaltum, so that it may be in absolute contact with it all over, and thus secure the utmost possible sharpness of the image. The collodion film is loosened from the glass in an acid bath, containing 1 part each of sulphuric and acetic acids in 320 parts of water, and the transfer is then effected in a bath of 1 part glycerine and 4 parts of water. The transferred film being dry, the plate is ready to be exposed to light, and as the asphaltum is not very sensitive, the exposure is somewhat long—extending from 6 to 36 hours; but it is better to over-expose and to work in diffused day-light rather than in the full sunshine.

When the plate is judged to have been sufficiently exposed, the collodion film is removed and the asphaltum surface is rubbed lightly with a tuft of cotton dipped in olive oil, to which after a short time a little turpentine is added. The image gradually begins to appear, and by degrees the unaltered asphaltum is all removed, so that the design appears in clear brown upon the polished copper. The plate is then washed with soap and water and allowed to dry.

The next operation is the etching or biting in of the image. The back of the plate having been well coated with a thick varnish of asphaltum, to protect it from the action of the acid, the plate is plunged into a trough

* See '*Traité pratique de Gravure Héliographique sur Acier et sur Verre*', par M. Niepce de St. Victor.

† Full details will be found in my '*Report on the Cartographic Applications of Photography*,' p. 79.

containing a mixture of 1 part chlorate of potash, 10 parts muriatic acid and 48 parts water, and allowed to remain till the weakest lines of the drawing begin to appear. It is then well washed and the asphaltum covering the lines is removed with benzole. The design will now be seen standing in a slight relief, and an electrotpe must be made in order to obtain a printing plate from which impressions may be taken in the ordinary way. The sharpness of the lines is better preserved by making a relief and electrotyping, than it would be by biting in.

The best results by this process are obtained from subjects in line, and even with these the operation of 'biting in' demands a little manipulative skill. Good results have, however, been obtained in reproducing half-tone subjects, but they require the greatest skill on the part of the manipulator and generally much re-touching by a practised engraver.

A modification of Niepce's process, by which good results have been obtained, has been introduced by M. Nègre, it is briefly as follows :

A plate of steel is covered with a coating of bitumen or bichromated gelatine and exposed to light under a negative. After development by a suitable solvent, which removes the parts not acted on by light, the plate is placed in a solution of gold and, by means of a galvanic battery, a thin regular coating of gold is deposited on those parts which present a clean metallic surface ; the remainder of the sensitive coating is then removed, and a beautiful damascened design in gold is obtained. The gold adheres well to the metal surface and as it is not attacked by the etching liquid, the design may be etched without injuring the ground of the plate.

This process also appears only suitable for line work, though it is said that satisfactory results in half-tone have been obtained with it.

M. Baldus, of Paris, is said to have used a similar process, but to have etched his plates in a solution of sulphate of copper by attaching them to the positive pole of a galvanic battery.

The processes dependent on the use of asphaltum are all more or less slow and uncertain in practice, and if not already quite abandoned in favour of the quicker and more certain processes dependent on the use of gelatine and bichromate of potash, are rapidly becoming so, especially as their usefulness is almost entirely confined to reproducing subjects in line. Exceedingly fine results can, however, be produced in this manner, and it is particularly valuable in cases where an 'etching' or 'biting in' process is required, because the bitumen forms a much better 'resist' for the acid or etching liquid than does gelatine, as we shall now see.

Etching processes with Gelatine.—In 1852, Mr. Henry Fox Talbot brought forward a method of photographic engraving called 'Photoglyphy,' which is of some interest as being the first practical photographic process founded on Ponton's discovery of the decomposition of bichromate of

potash in contact with organic matter under the influence of light. Talbot found that by the action of light, a dried film of gelatine mixed with an alkaline bichromate became impermeable to certain fluids in proportion to the intensity of the action of the light upon it. He coated steel plates with a thin film of gelatine and bichromate of potash, and after exposure to the light under a photographic positive, he etched the image so produced with a solution of bichloride of platinum which, penetrating the unaltered gelatine in the parts protected from the light and attacking the underlying metal, produced the shadows of the resulting picture. Some very promising results were obtained in this manner, and great expectations were entertained of its utility in producing engraved plates for book illustration and other purposes. These hopes, however, have not been fulfilled and the process, though remarkable as the first of the many valuable methods of photographic press-printing dependent on the use of gelatine and the alkaline bichromates, has inherent defects and difficulties which seem to render it of little practical value.*

M. Baldus has successfully employed a modification of the photoglyphic process for line-work.† He coats a copper-plate with gelatine and bichromate and exposes it under a negative or a positive, then etches in a solution of perchloride of iron, which attacks the copper in all the parts not acted upon by the light, and thus a first relief is obtained. As this relief is not sufficient, the plate is inked in with a printing roller, when the ink attaches itself to the parts in relief and protects them from the action of the etching liquid. This procedure is repeated till the desired effect is produced. If a negative is used an incised plate is obtained, which may be printed in the copper-plate press. If a positive is used the image is in relief and suitable for being printed with type. I have found that the reliefs obtained in this way are exceedingly sharp, though the gelatine films will not stand the action of the etching fluid for very long.

Messrs. Leitch and Co., of London, have lately introduced a similar process, called by them 'Photogravure.' It appears to be due to M. Garnier, who has had great experience in these processes and produced some very fine results. The method of working is a secret, but it is said that a metal plate is coated with a sensitive composition capable of resisting the action of acids. The photographic image is impressed on the sensitive surface through a negative and is then etched with perchloride of iron. The etching is said to be to a certain extent automatic, that is to say, the etching action on the lines ceases at different periods in proportion to their fineness.

* A full description of Talbot's process, with specimens, will be found in the appendix to the English translation of Tissandier's '*History and Handbook of Photography*,' edited by J. Thomson.

† See the above work, p. 207.

Daguerreotype Etching.—Many attempts have been made to engrave the beautiful and delicate photographic image formed on the Daguerreotype plate. Thus, Donn   simply etched the image with dilute nitric acid, which attacked the silver forming the shadows, leaving the whites protected by the mercury untouched. Grove etched the plates with the aid of the galvanic battery. Fizeau first etched as deeply as possible with dilute muriatic acid and then, having filled up the hollows with drying oil, deposited gold upon the lights; the oil having then been removed, the plate was bitten with dilute nitric acid. In order to render the silver plate more capable of standing the wear and tear of printing it was covered with a thin film of copper, which could easily be removed and renewed when required.

Other processes were also put forward, but they all failed, from the difficulty of biting the image to a sufficient depth and of obtaining the requisite 'grain' to enable a large number of impressions to be pulled off. None of them seem to have ever come into practical use and, like the Daguerreotype, they have almost fallen into oblivion.

If with the superior knowledge and appliances of the present day, any such process could be successfully worked, it would probably offer many advantages over any other etching process, especially for maps and other works in line.

Several ingenious processes of chemical engraving applicable to photography have been proposed by Messrs. Garnier and Salmon, Vial, Dulos and others; but as they do not appear to have come into practical use, it will be unnecessary to enter into details regarding them. Descriptions of them will be found in Roret's '*Manuel du Graveur*'.

Though they have the advantage of rapidity, all these processes, in which the image is obtained by etching or biting in with acids or other etching fluids, are open to the objection that for all subjects containing fine and delicate lines the etching and stopping out require almost the same manipulative skill and care as in ordinary engraving, and the processes consequently become expensive to work. There is also a tendency for the lines to become coarse and heavy. In those gelatine processes in which the etching fluid acts through the gelatine it gradually loosens the latter from its support and attacks the parts which should not be bitten at all. These defects are to a great extent obviated in the processes we are now about to consider, in which the printing plates are produced by the electro-deposition of copper on the photographic image.

Electrotyping methods.—In nearly all the electrotyping methods the printing plate is obtained by depositing copper on a gelatine relief obtained by the agency of light, or on a cast in plaster, gutta-percha, &c. taken from such a gelatine relief.

If a dry film of chromated gelatine on a suitable support be exposed to

ht under a photographic cliché, and then plunged into hot water, the parts acted on by light being insoluble will remain on the support in different degrees of relief according to the intensity of the light, while the unexposed parts will be washed away. An image in high relief formed of hard and insoluble gelatine will thus be obtained, from which a cast or electrotype in intaglio may be made.

If, however, instead of using hot water, the plate be plunged into cold water, the gelatine will be found to absorb water and swell up in the parts protected from the light, while in the parts acted on by the light it will only slightly absorb the water, and these parts will thus form hollows. The power of absorbing water will also be found to be in exact proportion to the degree of protection from light. In this case, an image in low relief is obtained which may also be moulded from, or electrotyped.

Upon these two principles several processes of producing printing-plates both for copper-plate and letter-press printing have been founded with more or less success.

The first process of the kind was Paul Pretsch's 'Photogalvanography', invented in 1854. He appears at first to have obtained his plates by coating a glass with gelatine and bichromate, exposing to light and then washing away the soluble gelatine and taking a mould of the resulting relief, in gutta-percha, from which an electrotype was made in the usual manner.*

This process gave fair results both in line and half-tone, but, owing to the washing away of the soluble gelatine being effected on the side of the film exposed to light, the plates were defective and required a good deal of touching up by skilled engravers, which vastly increased the expense of their production. The process failed as a commercial speculation.

Almost immediately afterwards, in 1855, Poitevin published methods of obtaining plates from the gelatine reliefs obtained by swelling the sensitive films in cold water. Plaster casts were either made from them or the gelatine surface itself was metallised and electrotyped in the usual way.†

This method produced tolerable results, though the prints were always somewhat coarse, owing to the fact that swollen gelatine will not give the same sharpness as when dry.

Both these processes were more or less unsuitable for reproducing subjects in half-tone—Pretsch's because in the process of washing away the soluble gelatine, the lighter half-tones were liable to be lost—Poitevin's because of the difficulty of keeping the swelling in proper relative proportion, owing to more absorbent parts of the film lying underneath less absorbent parts. Both processes also failed to give the necessary 'grain,' without which the proper inking of the engraved plates could not be effected.

* See '*Journal of the Photographic Society of London*,' Vol. III, p. 58.

† See '*Traité de l'impression photographique sans sels d'argent*,' p. 49.

Various attempts were made to improve on these processes, but unsuccessfully, until M. Placet showed that it was necessary to adopt in them the same principle of exposing on one side of the gelatine film and developing on the other, which, as we have seen, had previously been shown to be necessary for the preservation of the half-tones in the pigment-printing process, and for a similar reason.

M. Placet indicated several ingenious ways of obtaining his results.* They may, however, be briefly summed up as follows:

A film of chromated gelatine is exposed under a transmitted positive cliché, so that the light acts on the under side of the film; this is done either by covering the collodion side of the cliché itself with the sensitive coating, or by using a thin transparent sheet of transfer collodion or mica as a support for it. After exposure to the light, the film is soaked in water, whereupon those parts which have been protected from the light swell up in proportion to the amount of the action of light upon them. By treating the mould in relief thus obtained with metallic solutions, an electrotype copy in copper may be produced, which can be printed from in the copper-plate press.

If a negative cliché is used, the unaltered gelatine must be dissolved or a second electrotype must be made.

M. Placet also suggested the employment of a sensitive surface which would become soluble under the influence of light, such as a mixture of gelatine, or other colloid, with perchloride of iron and tartaric acid, as recommended by Poitevin for pigment-printing. In this case the solvent acting on the exposed side hollows out the image, in the same way as an etching fluid does on copper, but with the advantage that each line has only the exact strength given to it by the intensity of the cliché. Or the altered parts of the gelatine film may simply be swollen with cold water, producing an image in relief. In either case, a mould is taken from the gelatine and electrotyped, or copper may be deposited on the gelatine itself.

By his process M. Placet was able to obtain very perfect gradation of shade in the half-tones of his pictures, with a fine natural grain produced by some means which he did not divulge. He has lately, however, described a method of producing the grain, which consists in plunging the gelatine plate into a solution of bichromate of potash and then treating it with a solution of protosulphate of iron containing acetic acid.† The principle he lays down is first to treat the gelatine with a solvent and then with a solution of some substance that will tan or contract it.

Messrs. Fontaine, Avet and Drivet have also proposed similar processes, in which they have partially overcome the difficulty of obtaining a proper

* See Davanne, '*Les Progrès de la Photographie*,' p. 185.

† See '*Bulletin de la Soc. Franc. de Photographie*,' Vol. XXIII, p. 130.

'grain' by interposing between the cliché and the gelatine film a fine network or an impression of an engraved or roulette tint; but these artificial grains have a disagreeable effect, and the methods seem to have fallen into disuse, except for line-work and photo-typography, which will be described further on. Avet's process is, however, I believe, still in use for producing the maps of the Italian Surveys.

Geymet's method.—The fourth method, that of electrotyping from a gelatine relief obtained by the pigment-printing process, is somewhat similar in principle to Placet's process, but as there are important differences and the process appears likely to prove of some utility, it may well be treated separately.

According to M. Geymet, who has very fully described the process and all the manipulations of preparing and electrotyping the reliefs in his "*Gravure Héliographique*," it was the invention of M. Audra, a French amateur.

Pigmented gelatine tissue is sensitised and exposed to light exactly in the manner described at p. 78 for the 'Autotype' process. It is transferred to a smooth glass or a polished copper plate, developed in warm water, and when dry is metallised and electrotyped. If the subject is one in line or dot only the above operations are sufficient, but if the subject is a photograph from nature, or any other with gradation of shade, it is necessary to obtain a 'grain', and this M. Geymet does by taking a copper-plate with its surface grained or engraved with a ruled or roulette tint, inking it up in the ordinary way and then covering it with a coating of transfer collodion. When dry, the film of collodion is stripped off the plate and carries with it the impression of the grain. This film is then placed between the cliché and the sensitive gelatine film and serves to break up the shadows in the more transparent parts of the cliché.

A similar process has been used at the *Depôt de la Guerre*, in Belgium, for the reproduction of maps.*

Last year, whilst making some experiments on this process, I succeeded in obtaining the necessary 'grain' by chemical means which produce a finer and less artificial effect, and I have also made a few other modifications in the process, which may be worth recording at length.

A piece of the ordinary autotype tissue is sensitised in a 5 per cent solution of bichromate of potash. When dry, it is exposed to light under a reversed negative and then transferred in cold water to the surface of a well polished copper plate and squeegeed down into close contact with it. In order to prevent subsequent adherence to the newly deposited copper in the electrotyping bath, the copper plate is silvered by rubbing it with a little of the following solution mixed with tripoli.

* See Maës and Hannot '*Traité de Topographie, &c.*,' p. 330.

Nitrate of Silver,	1	part.
Cyanide of Potassium,	10	„
Water,	100	„

The gelatine tissue attached to the copper plate is allowed to dry, and then developed in warm water in the usual manner, great care being taken not to loosen the lines, an accident which is very liable to happen, though the preliminary drying of the tissue before development tends to prevent it.

When the image is quite clear from all soluble gelatine, the plate is well drained and plunged into a bath containing—

Tannin,	5	parts.
Strong Spirits-of-wine, ...	100	„

This at once removes all moisture from the gelatine relief, hardens it, and gives it a fine grain, coarser in the shadows than in the lights. The plate remains a few minutes in this bath till the action is complete in the deepest shadows; the tannin is then washed off with a little spirits-of-wine, and the plate is allowed to dry.

The gelatine relief has now to be prepared for receiving the electrotype deposit. A band of copper having been soldered to it, the back of the plate is coated with Brunswick black, to prevent deposition of the copper upon it. When the backing is dry, the margins of the picture are cleaned with a little of the silvering solution. The gelatine surface then receives a very slight coating of wax dissolved in turpentine, which is well polished off, and is rubbed over with fine plumbago or silver-bronze powder to render the surface conducting. The plate is then ready to be placed in the depositing bath.

Any good electrotyping arrangement may be used, but I prefer a Smee's battery with a separate depositing trough, containing a solution of 10 parts each of sulphate of copper and sulphuric acid in 100 parts of water.

A plate of copper, to serve as an anode and connected with the silver plate of the battery, is laid horizontally about an inch above the bottom of the depositing trough which should be large enough to allow the plate bearing the gelatine relief to be slipped under the anode. The relief-plate is connected with the zinc plates of the battery and, when everything else is ready, the circuit is completed by slipping it into the depositing trough under the anode. By laying the plates horizontally in this manner the deposit is more even and the gelatine film seems to be more readily covered with copper.

When the deposit of copper is of sufficient thickness it is separated from the matrix, and only requires a gentle 'oil-rubbing' to be fit for printing.

The plates obtained by this method show very good half-tone with an almost imperceptible grain, giving the effect of a fine chalk-drawing.

I have lately tried to obtain the images upon the copper by the double transfer process, making use of a flexible temporary support, consisting of paper coated with india-rubber, as first proposed by Swan, which can easily be removed with benzole after the transfer of the gelatine image to the copper. The 'grain' is given to the image by soaking it in water after the removal of the india-rubber paper, and then applying the solution of tannin in alcohol. This plan seems likely to be successful, if so, it will greatly simplify the operations and enable engraved plates to be obtained from any ordinary negative without the trouble of reversing.

By electrotyping direct from the gelatine relief, the results are always rather heavier and coarser than they should be, because, although hardened and insoluble, the gelatine relief can always absorb a little of the copper solution in the depositing trough and consequently the image swells and loses sharpness.

The strong tanning given to the gelatine film and the preliminary coating of wax before metallising the surface obviate this defect to a considerable extent; but it may perhaps be better to obtain a matrix in lead by pressure from the gelatine relief, and then to obtain the printing plate by electrotyping twice from the lead matrix. This is a more round-about and expensive method, but is likely to yield finer results and has been adopted by Woodbury and Rousselon in the processes next to be considered.

The process is simple and if it could be successfully worked out it might be usefully employed in this country in reproducing shaded maps and for other miscellaneous purposes. It has the very great advantage over photo-collotype that the plates can be corrected, if necessary, and can be printed in any numbers in the ordinary copper-plate press without risk of breakage or damage to the printing surface.

Woodbury-type methods.—It has already been shown that in the Woodbury-type process the photographic image is impressed into a soft metal plate by means of a relief in insoluble gelatine on a collodion support, and that instead of impressions being printed in ordinary printers' ink they are made in coloured gelatine. In such prints the gradation of shade is continuous and there is no perceptible grain.

Mr. Woodbury has proposed an ingenious method for obtaining gelatine reliefs with a granular surface, so that, when impressed into soft metal, electrotypes in copper may be obtained from the latter, which will serve as printing-plates for printing with printers' ink in the copper-plate press, and yield superior results to those obtained by electrotyping immediately from the gelatine relief.

A plate of glass is waxed and coated with a thin film of collodion, and a

mixture of gelatine and bichromate of potash, containing a quantity of fine emery, powdered glass or charcoal is poured over it and allowed to 'set'. The gelatine film is then dried and taken from the glass, and the collodion side exposed beneath a negative. After a sufficient exposure, it is temporarily attached, on the collodion side, with india-rubber solution, to a sheet of glass and washed in warm water.

The resulting granular image is then pressed into a sheet of soft metal by means of the hydraulic press. The soft metal plate has an electrotype made from it in copper, and another plate, subsequently covered with a coating of iron, is again made from this to serve as the printing-plate, the first copper plate being kept as a reserve.*

Mr. Woodbury also describes another method which in some respects resembles Geymet's, before described.

Paper is successively coated with three or more mixtures of gelatine, bichromate of potash and some granular substance in different degrees of fineness—first with the coarsest and lastly with the finest. When dry, the tissue is exposed under a negative, transferred under water to a finely polished plate of zinc or steel, then washed in warm water as usual, and when dry is ready for pressure into the soft metal block. In this case, the light tones are composed of the finest grains and the shadows of the coarsest.

M. Rousselon, the manager of Messrs. Goupil's photographic works at Asnières, near Paris, has obtained engraved plates with remarkably good half-tones by a process somewhat similar to the Woodbury-type, which is also largely worked by Messrs. Goupil. The peculiarity is in the grain, which is obtained by the addition to the sensitive mixture of gelatine and bichromate of some substance which has the property of causing the film to become granular under the influence of light, the granular effect being increased in proportion to the intensity of action of the light. The other operations are the same as in the first of Mr. Woodbury's processes just described. The details of this process are a secret, but it is said that the substance used for producing the grain is chloride of calcium.

I am not aware of either Woodbury's or Rousselon's processes being utilised for the reproduction of maps, but in certain cases they could, no doubt, be usefully employed. The only difficulty seems to be that an immensely powerful hydraulic press is required for large subjects.

Photo-mezzotint.—The Editor of the '*British Journal of Photography*' has lately suggested a process of photo-mezzotint engraving founded on the 'dusting on' or 'powder' process, already alluded to.†

A polished steel plate is thinly coated with—

* '*British Journal Photographic Almanac*,' 1872, p. 40.

† '*British Journal of Photography*,' Vol. XXIV, p. 170.

Saturated solution of bichromate of ammonia,...	5	drachms.
Honey,.....	3	„
Albumen,.....	3	„
Water,.....	1½	pint.

When the coating is thoroughly dry, the plate is exposed to light under a transparency. A large camel's hair brush is charged with a mixture of the two finest kinds of emery powder, and applied with a circular whisking motion all over the surface. The powder attaches itself to those parts of the plate on which the light has not acted, precisely in proportion to the amount of protection they have received, owing to the unaltered parts of the film attracting moisture and becoming 'tacky.' The most 'tacky' parts, forming the deep shadows of the picture, will attract the coarsest particles of the emery, the finer parts will take finer emery and the highest lights will take none at all. When the picture is fully developed, it is placed face to face against a polished plate of softer metal and passed between a pair of rollers, so that the emery powder image may be indented into the polished metal. The plate is then burnished in parts by a skilled engraver and when the desired result is obtained, is printed in the usual way in the copper-plate press.

This process seems capable of rendering useful service in the reproduction of maps.

Scamoni's method.—The last method is that recommended by Herr G. Scamoni, of the Imperial Russian State-paper Office, and is fully described in his '*Handbuch der Heliographie*,' already referred to. The results are exceedingly good, but the process is only suitable for line work.

Herr Scamoni having obtained a suitable negative of a drawing or other line subject, makes a positive copy of it in the camera by the wet collodion process, and after fixing, treats this positive with various successive intensifying solutions, so as to give it a very sensible relief. After drying the plate is varnished with a thin varnish and coated with fine plumbago, after which it is electrotyped in the usual way.

In the specimens I have seen of this process the lines are exceedingly sharp and fine, and it would seem well adapted for map-work.

A photo-mechanical process has lately been introduced by Messrs. Aubel and Kaiser of Lindenhöhe, near Cologne, and called '*Aubeldruck*.' The results for line-work are very superior but the process is a secret. It is believed to consist in some method of etching a glass negative, so that prints may be obtained direct from the glass surface or by transfer to stone.

In all cases where the printing-plates are obtained by electro-deposition of copper, and many copies are required, it is necessary to protect the engraved surface of the plate with a coating of iron by the process known as '*acierage*' or '*steel facing*.' This enables a very large number of copies

to be printed without deterioration of the plate, and the coating can easily be removed and renewed whenever required. Details will be found in Ure's '*Dictionary of Arts, Manufactures and Mines*,' article ENGRAVING.

IX. PHOTO-TYPOGRAPHY.

The object of the photo-typographic processes is to obtain a surface block by photographic agency, that may be set up with type in the same way as woodcut, stereotyped or electrotyped blocks, and be printed in the ordinary printing press. The process offers great advantages in the rapidity with which the blocks may be made and printed off in large numbers. Up to the present time no entirely satisfactory method has been discovered for printing subjects in half-tones in this way, though Mr. Duncan Dallas has produced some very promising results. The processes are, therefore, almost entirely limited to the reproduction of subjects in line or dot alone.

The operations in this branch of photographic reproduction are based upon exactly the same principles as the photo-engraving processes just considered, and in some of them the only difference is the substitution of a positive cliché for a negative, or *vice versa*.

The existing processes may be divided into three classes :

1st. Those in which a mould is made from a relief in swollen gelatine.

2nd. Those in which the image is obtained in asphaltum or gelatine on a metal plate and bitten in.

3rd. Those in which an image in a waxy and resinous ink is obtained by the methods described under the head of photozincography, then transferred to a metal plate and bitten in.

Moulding Processes.—Of the first class several methods have been introduced from time to time, but they are all on the same principle and are modifications of Pretsch's and Poitevin's processes already described, differing, as a rule, merely in technicalities which being trade secrets have not been fully published.

The following method is a typical one. A glass plate or other suitable surface is coated with a mixture of gelatine and bichromate of potash and when dry exposed to light under a negative. After this, it is immersed in cold water till the parts unaltered by the light, which represent the whites of the original drawing, swell up to the required height, leaving the lines quite sunk. The plate is then removed from the water and, the superfluous moisture having been carefully blotted off, is ready to have a cast made from it.

This may be done in two ways first, by metallising the gelatine surface either by means of plumbago or bronze powder, or by reducing silver upon it by applying a solution of nitrate of silver followed by treatment with a

solution of pyrogallie acid or of phosphorus in bisulphide of carbon. The gelatine relief then receives a thin deposit of copper in the usual way. The thin copper electrotpe is backed up with type metal, planed and mounted on a wooden block so as to be of the height of type.

This method gives the finest results but takes time.

The second method is to take a cast of the gelatine relief in type-metal. A cast in plaster, wax, &c. must first be taken from the gelatine, a second cast in plaster is made from this, and then stereotyped in the usual manner. This method is quicker than the last, but the results are coarser.

These processes are now largely used for illustrations in books and newspapers, but, so far as I know, have not been regularly applied to the reproduction of maps.

Etching processes.—The processes in the second class, in which a metal plate on which the image has been obtained on a sensitive coating of asphaltum or gelatine is bitten in with an etching liquid, though capable of giving very perfect results, are not, I believe, so much used as the other methods which are quicker and more simple.

A photographic image is impressed from a reversed negative on a copper or zinc plate prepared as in the Berlin engraving process described at p. 103, and, after development with olive oil and turpentine, is bitten in so as to yield an image in sufficiently high relief for surface printing, the precaution being taken of protecting the finest parts of the work as soon as they are sufficiently bitten, by covering them with stopping-out varnish.

If the sensitive surface is chromated gelatine, the soluble gelatine may be removed or not, but the etching fluid must be such that it will not dissolve or remove the gelatine from the surface of the plate—solutions of perchloride of iron, bichloride of platinum, nitrate of silver in alcohol, bichromate of ammonia in dilute sulphuric acid are some of the most suitable mordants for the purpose. In any case, the full amount of relief cannot be obtained through the gelatine at one operation. After the first biting-in the gelatine film must be removed and the lines protected from the further action of the etching fluid.

Gillotage.—The last class, in which a photographic transfer in resinous ink is made on a metal plate, and then bitten in, comprises the simplest and most largely used of these processes.

The process generally employed is substantially the same as Gillot's "paniconography", now commonly called 'Gillotage,' which is largely used for illustrated papers and various other purposes.

A polished zinc plate, which has been strongly varnished at the back to protect it from the acid in the subsequent operations, receives a transfer in greasy ink, either from an engraved copper plate, a lithographic drawing on paper, or a photo-transfer print prepared as for photozincography.

The plate is then etched in the usual way and rolled up with a varnish ink, containing a large proportion of resinous matter ; it is then dusted with powdered resin, which sticks to the lines and renders them more capable of resisting the acid ; the superfluous resin is brushed off and the plate is gently heated.

The edges of the plate and the large white spaces are covered with shellac varnish and when the varnish is thoroughly dry, the plate is plunged into a trough containing very weak dilute nitric acid, kept in constant motion, and is left until the finest parts are sufficiently bitten, which generally takes about a quarter of an hour ; it is then taken out of the trough, washed, dried, and placed on a sort of grating over a charcoal fire. Under the influence of the heat, the coating of ink and resin on the lines, being gently softened, flows down and protects the sides of the hollows formed by the first biting, filling up the spaces where the lines are very close. As soon as this effect is produced the plate is allowed to cool and then inked with a lithographic roller, as if a proof was going to be pulled. It is again dusted with powdered resin, and is then ready for a second biting in, which is to attack the parts somewhat lighter, and therefore may be effected with stronger acid.

The operations of inking, dusting with resin, heating and biting with acid are repeated several times till the plate presents only a uniform black colour. Then the plate is bitten with strong dilute acid which bites out the parts to be left completely white. The large whites, which have been covered all along with a strong shellac varnish, are then cut out with a saw, and the plate is ready to be mounted on a wooden or leaden block for printing. These plates usually require considerable touching up to take off the ragged edges of the lines caused by the spreading of the ink, though this may also be done by repeating the inking and biting in, so as to remove the steps formed by the successive bitings.*

This process has been applied at the Imprimerie Nationale, Paris, for producing large geological maps, but the special precautions that had to be taken in "overlying" the plates in the press so as to print properly were very tedious, and must have largely increased the expense and lessened the use of the process. Messrs. Yves and Barret, of Paris, are said to use it largely for reproducing maps and engineers' plans, &c.

Photo-blocks in half-tone.—Many attempts have been made from time to time to obtain surface blocks from photographs from nature and other shaded subjects, but with imperfect success. If this object could be successfully attained, it is easy to understand that it would be of immense value for book and newspaper illustration and many other purposes. There are, unfortunately two grave difficulties to be overcome—one caused

* See Davanne, '*Les Progrès de la Photographie*,' p. 201.

by the fact that to produce a successful printing block the surface of all the lines or dots which receive the ink must be very nearly on one uniform level, and therefore the moulding processes above described are inapplicable. The second and greater difficulty is to obtain a suitable grain to break up the continuous gradation of shade in the photograph.

M. Rodriguez, of Lisbon, has proposed an ingenious method by which promising results have been obtained. He makes a paste of sugar of milk, or some other substance in powder soluble in nitric acid, with a little oil of lavender and bitumen, and adds a sufficient quantity of it to a solution of bitumen in turpentine. The metal plate is thinly coated with this in the ordinary way, exposed to light and developed with turpentine. The plate is then plunged into a bath of dilute nitric acid which gradually penetrates the resinous coating and dissolves the substance used for forming the grain, breaking up the preparation more or less according to the thickness of the bitumen, and thus reproduces the half-tints of the originals.*

In many processes of collotype the gelatine film presents a very marked grain, which may be coarse or fine according to the composition employed. It is probable, though I have not tried it nor, so far as I can recollect, seen it proposed, that blocks showing very fair half-tone could be obtained by taking a print from such a plate with a grain, transferring it to zinc and then biting it in by a method similar to Gillot's already described. Very great care would have to be taken in the successive etchings to preserve the uniformity of surface and protect the finest tints from being bitten too much.

The prints in half-tone obtained by Mr. D. Dallas' process, known as "Dallastint", appear to have been produced by some such method. This, however, is only a conjecture on my part, because no details of the process have been published.

M. Rousselon has, I believe, obtained fair results by similar transfers from his engraved plates, and it is probable also that a transfer to zinc from one of the plates, prepared by the modification proposed by myself of Geymet's photo-engraving process, bitten in in the same way, might also answer the purpose, though the grain is perhaps scarcely strong enough.

Details of several of the methods of photo-typography will be found in Motteroz's "*Essai sur les gravures chimiques en relief*" and Scherer's "*Lehrbuch der Chemigraphie*."

X. MISCELLANEOUS PROCESSES.

In addition to the processes by which photographic prints are obtained directly by the aid of light, there are several ways in which photography can be employed as a useful auxiliary in obtaining correct tracings for the

* See '*Bulletin de la Soc. Franc. de Photographie*,' pp. 208, 254.

use of the draughtsman, engraver or lithographer, thus saving all the labour of hand-tracing and obtaining also a far more accurate image than could possibly be obtained in any other way.

Blue-Prints.—It is well known that when photographed a pale blue colour acts exactly as if it were white. If, therefore, we can obtain by photography an accurate image of any original drawing or other subject in pale blue ink, either on the same, an enlarged or reduced scale, it will be possible to redraw the whole or part with black ink over the blue print, in a style suitable to be again reproduced by photography, without fear of obtaining a double image. It will also be obvious that the blue ground-work will be more complete and more accurate than any tracing by hand or pantograph could possibly be.

It has already been stated that this method has been extensively used in the Survey of India for making reductions of maps to smaller scales, and at the same time generalising the details on the large-scale maps so as to adapt them to and render them more suitable for the smaller scale.

The same system may be applied to the production of maps or plans in several colours, thus: supposing a map is to be reduced and printed in three colours, black for the outline and names, brown for the hills, and blue for the streams and other water.

Three blue prints are given to the draughtsman who draws on the first only the outline and names, on the second the hills, and on the third the water. These three drawings are then very carefully photographed all on the same scale, and transfers are made from them on to three stones or zinc plates, which are then used for printing the different colours of the map just as in ordinary chromo-lithography.

There is no limit to the number of colours that may be employed, and as the blue-prints are all on the same scale, very perfect 'register' may be secured, if due care be taken in the drawing and subsequent photographic operations.

The advantage of using photo-zincography for preparing the blue-prints is that in reducing a large-scale map, the transfers of the several sections may be joined together and printed off in one sheet, and thus may be redrawn in a more complete manner than if the sections had each to be drawn separately and afterwards joined up.

It is not, however, always desirable or possible to obtain the blue prints by photozincography, and they may be obtained in a more direct manner by coating paper with bichromate of potash and gelatine, exposing under a negative, well washing the print with hot water to dissolve the gelatine, then steeping it in a solution of proto-sulphate of iron, again well washing and then applying a solution of ferrocyanide of potassium, and finally well washing. A pale blue print is thus obtained which will answer

every purpose. The 'cyanotype' process, before described, might also be used, but the blue is much more intense and would be liable to produce a double image on the copy.

Besides its uses in the Survey Department, the blue-print method is also appreciated and utilised by engineers and other public officers in India, who desire from time to time to show alterations or improvements on a standard plan, or wish to make use of a standard map for showing their own special requirements.

Bichromate-prints.—In the case of miscellaneous subjects which it is desirable to lithograph, photography can also be usefully applied in giving the lithographic draughtsman an accurate tracing over which he may make his transfer-drawing in the usual way. This was formerly done by making a silver-print on the required scale, and then either tracing over it on lithographic tracing-transfer paper, or coating the print itself with the composition used for lithographic transfer paper and re-drawing on the print itself; but in either case, the dark colour of the photograph interferes very much with the drawing.

A method of overcoming this difficulty has been suggested by Mr. Fraser S. Crawford of the Government Photo-lithographic Office, Adelaide, S. Australia, and has proved exceedingly useful here in Calcutta. A print is taken from the negative, on the paper prepared with gelatine and bichromate of potash for the photozincographic transfers, but it must be printed as deeply as possible, so that the lines may remain clearly visible after the bichromate has been washed out. Instead of inking the print, it is simply washed till all the soluble bichromate is removed, and is then dried. The surface of the print is coated with the ordinary composition of starch or isinglass used for preparing lithographic transfer paper and, according as the drawing is to be executed with the pen or chalk, receives a smooth or grained surface by passing it through the press either on a polished or grained copper plate. The draughtsman then makes his drawing with autographic ink or lithographic chalk over the faint russet image on the photographic print. An ordinary silver-print can be given as a guide in cases where the bichromate print is not sufficiently distinct for the details to be easily made out. This method is very suitable for copying maps, sketches, or photographs from nature, especially if the former are to be on a smaller scale than the original. The light colour of the photographic print renders it easy to see the effect of the drawing above it. The saving of time and labour in tracing and the superior accuracy of the ground-work are also great advantages gained by its use.

Photographing on Stone.—The following method of photographing direct on stone may sometimes be of use with the same object, when the lithographic drawing is to be made on the stone itself and not transferred.

The surface of the stone is made as level as possible and carefully polished, it is then washed with an 8 per cent solution of chloride of calcium and dried. A 12 per cent solution of nitrate of silver is then washed over the stone in the dark, and when dry it is exposed to light under a reversed negative. The print is fixed with a 20 per cent solution of hyposulphite of soda, and then well washed with plenty of water to remove all traces of the hyposulphite.

This method is used at the Topographical Department at the Hague to give the ground-work for the beautifully engraved chromo-lithographed maps of the Dutch Netherlands, and for the reproduction of photographs of Dutch artillery material, by a similar system of engraving upon stone permitting several shades of the same tint to be printed from one stone.*

Photographing on Copper.—A photographic image may also be obtained upon a copper plate by the following method, proposed by M. Mialeret, which may be of use to engravers in giving them an accurate image of their subject to work upon.†

The copper plate, being well cleaned and ready for engraving, is plunged into a solution of

Sulphate of Copper,	125 parts.
Sea Salt,	75 „
Water,	960 „

and allowed to remain for about a minute, it is then taken out of the bath, well washed and polished with a soft cloth. It is next exposed to light for about 5 or 10 minutes under a reversed negative, or even under a paper print on thin paper, care being taken that the design appears reversed on the plate. The plate is then removed from the printing-frame and plunged into a 20 per cent solution of hyposulphite of soda containing a little chloride of silver. After a few seconds the ground whitens, while the design becomes of a deep black. The plate is then taken out and well washed. The black deposit forming the shades may be removed or allowed to remain, in which case the plate should be varnished. It is said that these images may be etched by the use of menstrua which will attack the copper without affecting the silver, but I have not been successful in this application of the process.

XI. CONCLUDING REMARKS.

Having now described the different processes most capable of being utilised by the cartographer, it may be as well to briefly sum up the cases in which they are applicable, and to indicate the direction in which improvements should be looked for.

* 'Report on the Cartographic Applications of Photography,' p. 58.

† 'Photographic News,' Vol. X, p. 190.

The applications of photography to copying purposes may be divided into two principal classes, according as the original subjects have or have not been specially prepared for photographic reproduction.

As regards subjects in the first class, it is possible to adapt and prepare the original drawings, so as to fit them for the requirements of any photographic process considered most suitable to meet the object in view. As a rule such drawings will be intended for publication or reproduction in large numbers by the photo-mechanical processes rather than by silver or pigment-printing, which will do very well for small numbers.

For the reproduction of maps and plans a process is required which will admit of large-sized sheets being produced. Many processes capable of yielding very beautiful results when employed for subjects of small size are quite unsuited for larger work.

For map-work in line, photozincography will generally be found most suitable and convenient on account of the simplicity of the operations, the facilities it gives for joining several small sections into large sheets, and the short time required for turning out a large number of copies. Under favourable conditions, photozincography will give very excellent results for all practical purposes. If anything finer is required for permanent or standard purposes, then one of the engraving processes would be most suitable, and in certain cases the photocollotype could also be applied with advantage. For diagrams and small maps &c., to be printed with type, photo-typography will prove useful.

For shaded or coloured maps and drawings, photozincography and phototypography are not applicable, and recourse must be had either to photocollotype or to one of the engraving methods with bichromate and gelatine which will give gradation of shade, such as Rousselon's, Woodbury's or Geymet's. It is probable that these latter processes will prove of great use as soon as their requirements and capabilities are better known.

It may be as well to repeat that whenever it is possible, drawings specially prepared for reproduction by photography should be drawn on a larger scale than they are ultimately required.

With regard to subjects in the second class, it is evident that the choice of a photographic process must depend very much on the nature of the original subject and its suitability for photographic reproduction by any particular method, as well as on the number of copies required.

It would be impossible to notice here all the cases coming within this class, it will therefore perhaps be sufficient to state that in most instances when only a few copies are required and permanency is not an object, ordinary silver printing will be found most convenient for all classes of subjects; and where the original is sufficiently translucent and photographic cameras not available, both negative and copy may be obtained in this manner sufficiently good for many practical purposes.

If the greatest simplicity in the printing operations is an object, the cyanotype or other iron processes may be used. If the prints are required to be permanent, the simple pigment process or the autotype may be employed, according as the original is in line or shaded.

If a large number of copies are required, then it will be more advisable to employ one of the photo-mechanical processes. The choice will depend much upon the nature and importance of the subject. As a general rule, in cases where the original is a lithograph, engraving or wood-cut, the best effect will be produced by employing an analogous photographic process.

Photolithography or photozincography is generally applicable to all subjects in dot or line, which can be printed in the lithographic press, except very fine delicate engravings or drawings; but if a block is required for printing with type it must be produced by one of the photo-typographic processes. The photo-collotype processes are of more general application and may be used for every kind of subject whether in line or half-tone. Their use is, however, restricted to subjects within the limits of a single negative, and they do not present the same facilities for carrying out alterations and corrections as the lithographic and engraving methods do, and thus their value for reproducing maps &c. on which corrections may be required is very much diminished. The fact of the printing surface being composed of an unstable organic substance like gelatine gives these processes an element of uncertainty which is a great drawback to their extended use on the large scale, especially in hot climates, and a really satisfactory and simple photo-mechanical process capable of reproducing any kind of subject without limit of size within ordinary dimensions is still a desideratum. The photo-engraving methods are the most suitable for high-class work which is likely to repay the cost of the skilled hand-labour required to finish and prepare the plates for the press. A simple method of photo-engraving of general applicability would be most valuable, and it is hoped that such a process will before long be available.

Use of Photography in War.—For the reduction and enlarging of military and topographical sketches, and for multiplying copies of maps and sketches required for use during a campaign, photography can render great services. The principal supply of such maps should, of course, be provided by a permanent office, established in a capital town and well provided with the proper appliances. The extent to which photography can be used in the field will depend on the character of the theatre of operations, available water-supply and means of transport, as well as other military considerations. In an open country with tolerably good roads, a complete photographic equipment might be carried in wagons specially fitted up for the purpose, and arrangements made for copying, enlarging or reducing sketches, maps or plans, and printing them by photozincography or

on a paper specially prepared for photocollotype printing, which would only have to be sensitised when required and, after exposure under the negative, could be fastened down on to a metal plate and printed in an ordinary printing press. In this way also views or other subjects unfit for photozincography might be printed if required in larger numbers than could conveniently be accomplished by silver-printing.

In connexion with such a method of printing by photocollotype, it would be very convenient to arrange for drawings being made on a tissue consisting of a transparent basis, such as waxed paper or sheet gelatine, covered with a thin opaque film which could be easily cut through with an etching-point. Such drawings would form very perfect reversed negatives.

Apparatus and appliances for taking views by the dry and wet processes and for taking prints of them in the ordinary way should also form part of the equipment.

A military photographic travelling field equipment of this kind has been organised in the English service and attached to the Field Train of the Royal Engineers. A description of it was given by Capt. Abney in a paper read before the British Association in 1874.*

In the case of operations in a wild or hilly country, the photographic equipment must be limited to the most indispensable requirements, and be regulated by the nature of the transport available and by other local and military considerations. It is very doubtful whether photozincography could be advantageously carried out in such localities, and the photographic outfit might be limited to some moderate-sized sets of apparatus for views and copying, with a large stock of dry plates and the necessary appliances for silver-printing. Some of the simple iron processes of printing might perhaps be usefully employed. Recent improvements in the preparation of dry plates by what are called the emulsion processes have greatly facilitated and simplified the practice of photography in the field, so far as taking the negatives is concerned, and a sensitive tissue has been prepared by Mr. Warnerke for this purpose, by which the use of glass plates may be dispensed with.

The apparatus, &c., should be strongly packed in moderate-sized parcels so as to be carried either by men or pack-animals.

At the same time it should be stated that it seems very doubtful whether photography can really be employed with much advantage *in the field* under the conditions of modern warfare in civilised countries. Its main use in any case will be the copying of reconnaissances and sketches of positions preparatory to a battle and of sketches and views of positions on the battle-field after the event. The delicate operations required either for taking negatives or for printing copies from them cannot satisfactorily

* *British Journal of Photography*, Vol. XXI, p. 415.

be carried out on the move; and therefore the photographic establishment must be more or less stationary, and this may prevent its employment in many cases where it might perhaps be of use. In the Abyssinian Campaign, a staff of photographers from the School of Military Engineering, Chatham, accompanied the force and did good service, under great difficulties, in copying route maps and sketches, and in taking pictures of objects and points of interest. In the Franco-German Campaign in 1870-71, the Germans organised a photographic brigade to accompany the Head Quarters of the army. It was found, however, that the photographers encumbered with apparatus, &c. could not keep up with the movements of the Head Quarters and, indeed, the want of them does not seem to have been very much felt.*

If facilities exist for the transport and working of a small lithographic press, it will be found more convenient to have original sketches drawn with transfer ink for immediate transfer to zinc than to reproduce them by photography, and for this purpose an excellent ink has been devised by Capt. Abney, which may be used on any kind of paper without preliminary preparation. It will also be found a great advantage to print copies of maps on ordinary calico, because it can be folded and packed away much more easily than paper and does not so readily get worn by use. This plan has been adopted in the Surveyor General's Office with success in preparing maps for the Camps of Exercise in this country.

Another use photographic reproduction can be put to in time of war is the preparation of miniature despatches to be sent by pigeon-post. Such despatches were largely used in the Franco-German Campaign for communicating with the beleaguered garrison and residents in Paris. This is a service that photography alone can render and it is likely to be largely utilised in any future European war in similar cases.

* See Capt. Hannot's '*La Photographie dans les Armées*'.



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VII.—*Notes on some Reptilia from the Himalayas and Burma.*—By
W. T. BLANFORD, F. R. S., &c.

(Read 5th June.)

The species described in the following pages are chiefly from a very interesting collection made by Mr. W. Davison in the Tenasserim provinces. One snake is from another collection made in Sikkim by Mr. Gammie.

DRACO MAJOR, sp. nov.

D. peraffinis D. dussumieri, naribus superne versatis, pede posteriore axillam haud attingente; tympano nudo; tuberculo parco utrinque superne post supercilium oriente, cristâ nuchali nullâ; sed multo major, appendiculâ gulari longâ squamis majoribus indutâ, nonnullis squamis majusculis distantibus in lineâ unicâ interruptâ laterali ad insertionem alæ collocatis, nec aggregatis; alis aliter coloratis, fusco-transfasciatis, vel omnino pariter marmoratis nec versus margines saturatioribus.

Hab. in provinciâ Tenasserim, haud procul ab urbe Tavoy atque ad radices montis Nawiabu dicti.

Description. The hind limb falls a little short of the axil, when laid forwards. Nostrils directed upwards, tympanum naked. Upper labials large, some of them exceeding the nasal shield in length. A small tubercle above at the hinder extremity of the orbit. No crest of enlarged scales. Dorsal scales sub-equal in size, not keeled, a few much larger scales, usually at a considerable distance apart, in a single interrupted row along each side

of the back at the insertion of the wing. Gular appendage covered with large scales, each fully twice as long and broad as the scales of the abdomen. Abdominal scales keeled. A fringe of large pointed triangular scales, many of them nearly equal to the tympanum in breadth, along the hinder part of the thigh and each side of the basal portion of the tail. Tail triangular near the base, with a row of slightly enlarged and sharply keeled scales along its upper edge. Scales below the tail, near the base, but not just behind the anus, larger than those at the sides.

The colouration above in spirit is nearly uniform, the wings are marked with very distinct dusky cross bands, broken up by light spots in the only female collected, but these markings are less distinct or wanting in the males, in which the wings are mottled with pale irregular spots. In some the wings are rather darker near the margins, but this is not so distinct as in *D. dussumieri*, and there is never the dark fringe with narrow sub-parallel pale transverse lines of that species. Throat unspotted, greenish yellow in spirit, pale scarlet beneath the lateral appendages.

This is probably the largest species of the genus known. The largest specimen, a male, measures 14 inches in extreme length, of which the head and body from nose to anus measure 4.75. Two other males have the body of the same length, the tail being about an inch shorter. A female is less in all its dimensions, nose to anus 3.5, tail 5.75. The sex has been ascertained by dissection. In the female the gular appendage is very short. From the condition of the ovary the specimen is probably adult. All the examples captured were obtained in the forest east of Tavoy, two being from the foot of Nawlabú hill, a high ridge some eight miles east from Tavoy town.

The nearest described species are *D. quinquefasciatus* of Penang and *D. dussumieri* of Malabar, and strange to say the latter, although so widely removed in locality, is the more closely allied of the two in structure. The present form is distinguished from both by its much larger size and from *D. quinquefasciatus* by its naked tympanum and longer hind limbs. From *D. dussumieri*, *D. major* is known by having much larger supra-labials, each plate near the middle of the lip on each side exceeding the nasal in length, by the enlarged scales at the sides being single and not aggregated into groups, by the much larger scales on the gular sac, and by the colouration of the wings.

Besides the new form, *D. maculatus* and a species which is probably *D. tanipterus* were obtained in the same forest. The typical specimen of the last named species, a male from Chartaboum, was said by Dr. Gunther,* who described it, to have a very low nuchal crest and no tubercle above the orbit. Now in two males of the Tenasserim dragon, there is a

* Rept. Brit. Ind., p. 126.

small tubercle above the orbit and there is no nuchal crest, but as in one specimen there is a longitudinal row of scales very slightly larger than the others along the back of the neck, and as the supra-orbital tubercle is small, these characters may be variable, and I hesitate to separate the species upon such slight data without actual comparison. Still it is not quite certain that the Tenasserim lizard is the true *D. tæniopterus*.

BRONCHOCELA BURMANA, sp. nov.

B. omnino viridis, affinis B. cristatellæ, B. molluccanæque, sed squamis lateralibus minoribus, in series longitudinales ad 25 dispositis, serie dorsali parum majore, cristâ nuchali parvulâ, scutis majoribus post supercilium nullis.

Hab. ad Tavoy in Tenasserim.

Description. Scales of the sides of moderate size, smaller than in *B. cristatella*, larger than in *B. jubata*, in about 23 to 25 longitudinal rows, fewer behind, scales of the abdomen much larger, in about 12 rows, all sharply keeled. Dorsal row of scales distinctly larger than those of the sides, nuchal crest very low, formed of a series of triangular flat spines, passing between the shoulders into the dorsal row of scales. No fold before the shoulder. There are no enlarged scales behind the superciliary ridge, all the scales between the eye and tympanum are nearly similar, those in the middle are a little larger than the others, but there is no distinctly enlarged scale. The hind limb, laid forwards, does not quite extend to the end of the snout, the fore limb extends to the thigh, the fourth hind toe is one-fifth longer than the third. Colour grass green throughout, paler below, no dark patches nor yellow bands on the body. On the top of the head, the supra-orbital regions are surrounded by slightly enlarged scales of a dusky purplish colour, but this may be individual or due to change of tint in spirit.

This species is at once distinguished from *B. cristatella* (and from *B. molluccana* if that be really different)* by its larger lateral scales, by its much lower nuchal crest and by the absence of any enlarged scales behind the supercilium. From *B. jubata*, on the other hand, the present form may be known by the lateral scales being larger, as well as by the want of enlarged scales behind the supercilium. There is no specimen of *B. smaragdina*† in Calcutta for comparison, but that species has evidently much larger lateral scales, no true nuchal crest, longer limbs, different colouration, and very much larger scales on the throat, for there are said to be only 16 series between the angles of the mouth, whereas in *B. burmana* there are double that number.

* Stoliczka, J. A. S. B., XXXIX, Pt. II, p. 179.

† Günther, Rept. Brit. Ind., p. 138.



The only specimen of *Bronhocela* collected by Mr. Davison was procured near Tavoy. The size is about the same as that of other species; from nose to anus 3·7 inches, tail about 12 inches when perfect.

LIOLEPIS GUTTATUS.

Mr. Davison's description of the habits of this lizard, of which he has procured several specimens, supplements Mr. Theobald's.* All the specimens procured were found in perfectly open places devoid of vegetation, a favourite position being in the hard threshing floors made in the middle of dry rice-fields. Here *Liolepis* makes its burrow and is seldom found far away from the mouth of its hole. This appears to confirm Mr. Theobald's opinion that *Liolepis* never ascends trees, as Cantor supposed.

Mr. Theobald classed together *Uromastix*, *Liolepis* and *Phrynocephalus*, in a distinct family, which he called *Uromastidae*. The distinction of the family has been accepted by other naturalists, and so far as the genus *Uromastix* is concerned, has some important structural peculiarities in its favour, but I have already given my reasons† for dissenting from Mr. Theobald's views as to the alliance between *Uromastix* and *Phrynocephalus*, and I now feel some doubt as to whether there is any close connexion between *Liolepis* and *Uromastix*, despite the circumstance that both burrow, and that there is some slight similarity in their habits. *Liolepis* wants the peculiar dentition of *Uromastix* and is no more exclusively herbivorous than *Stellio*. I have examined the stomachs of three specimens of *Liolepis*: in one I found nothing except insects, (chiefly crickets and termites,) whilst in the other two there was a mixture of insects and vegetable substances, fragments of small fruits and apparently of leaves. The intestinal tract is much shorter than in *Uromastix*; in a specimen of *L. guttatus* 16½ inches long, the whole length of the stomach and intestine (preserved in spirit) is 16 inches. In *Uromastix* the length of the intestine is much greater than that of the body and tail; in a fresh specimen of *U. hardwickei*, measuring 12½ inches, the intestinal tract was 27 inches long. In a large example of the Mesopotamian *U. microlepis*, preserved in spirit and 17 inches in length, the intestinal tract was also 27 inches long. Moreover, in *Uromastix* the form of the cœcum is different, and much more complicated than in *Liolepis*, in which there is simply an expansion of the intestine.

ULUPE,† gen. nov. *Lycodontidarum*.

Corpus gracile, compressum. Caput breve, depressum, collo paullo latius. Oculi pupilla elliptica, verticalis. Scutum loreale cum præoculari

* Jour. Lin. Soc. X, p. 34. Descriptive Catalogue, Rept. Brit. Ind., p. 119.

† Eastern Persia, II, p. 334, note.

‡ Etym. Ulúpi, a princess of the Nágas or serpents, mentioned in the Mahá Bháráta.



junctum; nasale haud bipartitum. Squamæ corporis in tredecim seriebus longitudinalibus, læves, ventrales ad latera angulatæ, subcaudales biserialiter ordinatæ.

ULUPE DAVISONI, sp. nov.

U. scutis præfrontalibus cum postfrontalibus longitudine fere æqualibus, verticali mediocri, occipitalibus duplo majoribus; loreali longo ad oculum attingente; præoculari alio nullo, postoculari unico; supralabialibus 7, tertio quartoque infraorbitalibus; ventralibus 265, anali integro; subcaudalibus 108; superne nigra, albo-transfasciata, annulis antice latioribus atque magis distantibus, subtus albida.

Hab. in provinciâ Tenasserim Burmanicâ, haud procul ab urbe Tavoy.

Description. Body, slender, compressed. Head a little broader than the neck, short, depressed. Pupil elliptical, vertical. Shields of head regular, nostril in a single shield; loreal and præocular united. Scales of body smooth, in 13 rows. Ventrals 265, strongly angulate at the sides, anal undivided, subcaudals in 108 pairs. Maxillary teeth few in number, a space behind the anterior tooth, followed by three or four teeth close together, the two anterior rather the longest; mandibular teeth small.

Head shields.—Rostral much broader than high, scarcely extending to the upper surface of the head. Anterior frontals as long and nearly as broad as the posterior, the anterior edges of the former meeting at a slight angle directed backwards, and each anterior edge being about equal to the suture between the two shields. Vertical of moderate size, about half of an occipital, the sides convex, curving gently towards each other at first, more rapidly behind. Occipitals rounded behind. Nostril small, rather nearer to the anterior than to the posterior extremity of the nasal shield, which is much longer than high, and has only one shield, of about the same shape, and apparently consisting of the loreal and præocular united, between it and the eye. No other præocular is present; one postocular; the superciliary descends on the side of the head before and behind the eye. Upper labials 7, the 3rd and 4th forming the lower edge of the orbit; temporals 1 + 2.

Colour in spirit, above black with white cross-bands, each about a third of the width of the intervening dark space, becoming broader on the sides; lower parts white; so the colour may be described as white with large black spots above. The white rings and black interspaces are broadest near the head and become much narrower behind, and still narrower on the tail, but the proportion of the two colours remains the same. On the single specimen collected there are 36 white rings on the body, 26 on the tail, the last being terminal. The white sides and lower parts, on the hinder part of the body and the tail, are spotted and mottled with dusky. Head,

blackish above, but with a white band on each side from the white sides of the neck passing over each occipital to the superciliary shield, the two bands being only separated by a narrow dusky space behind the vertical. Lower portion of upper labials white.

A single specimen of this interesting snake was obtained by Mr. Davison at the foot of Nawlabú Hill, east of Tavoy, in evergreen forest, at an elevation of about 1,500 feet above the sea. This specimen measures 28 inches, of which the tail is 6.

It appears to me that this snake must be considered the type of a new genus of *Lycodonts*, distinguished from all other Indian forms by the small number of scales round the body. The single nasal shield, the union of the præocular and loreal, and the strongly angulated ventral shields are also a peculiar combination of characters, although all are found in some other genera of the same family.

OPHITES GAMMIEI, sp. nov.

O. squamis corporis in 19 series longitudinales ordinatis, dorsalibus carinatis, lateralibus lævibus; scutis præfrontalibus pariter longis atque latis, postfrontalibus tripliciter majoribus; verticali vix longiore quam lato, lateribus convexis; loreali parvo, longiore quam alto; præoculari unico, postocularibus duobus; supralabialibus 8, tertio, quarto, quintoque infraorbitalibus; ventralibus 214, anali integro, subcaudalibus 101. Color fuscus, annulis antice albidis, postice griseis, marginibus irregularibus, variegatus.

Hab. in Sikkim.

Description. Scales of the body in 19 rows, the 9 dorsal rows keeled, 5 rows at each side smooth. Body slender, compressed, head rather broader, flat. Eye small, pupil apparently vertical. Ventrals 214, bluntly angulate at the sides, anal entire, subcaudals 101 pairs.

Head shields.—Rostral about as broad as high. Nostril large, between two nasals, but scarcely separate from the anterior frontal. Anterior frontals small, each about one-third of a postfrontal and about as broad as long; postfrontals much broader in the middle than they are in front or behind, their anterior and posterior outer corners being hollowed out to receive the nasal and præocular shields, between which each postfrontal is bent over the side of the head above the small loreal. Vertical very little longer than broad, with convex sides. Each occipital is about twice as large as the vertical, rather attenuate behind, with the posterior termination rounded. Upper labials 8, the 3rd, 4th and 5th entering the orbit. Loreal small, longer than high. One præocular, just reaching the upper surface of the head; 2 postoculars. Temporals irregular. Two elongate chin shields of about equal length, the anterior in contact with 5 lower labials.

Colour in spirit, evidently somewhat faded. The body is surrounded by alternating dusky and light rings with very irregular crooked margins. Head above dusky olivaceous with pale spots in the middle of most of the shields; upper labials and anterior lower labials pale with dusky margins. An imperfect pale collar behind the head: all the lower part of the head and neck whitish. There are 30 pale rings on the body, the first pale ring imperfect above, and the dark patch in front not continuous across the throat, the rest of the rings encircle the animal. Farther back the pale rings become grey with pale margins and light spots occur in the dark rings. On the belly, throughout the anterior part of the body, the dark rings are only about half as broad as the white, above the difference is less, and near the head the dark rings are much broader above than the white. There are 16 rings on the tail.

This snake is distinguished from all other species of *Ophites* by having 19 instead of 17 rows of scales round the body. It approaches nearest to *O. septentrionalis**, the precise habitat of which is unknown, but is probably the Himalayas or Assam, the type specimen having been collected by Dr. Jerdon soon before his departure from India, and found unlabelled amongst his collections after his death. From *O. septentrionalis* the present species appears to be distinguished by more numerous scales, by its differently shaped anterior frontals, and by the dark rings extending across the belly.

A single specimen was procured by Mr. Gammie at the Cinchona plantation in South-eastern Sikkim. This specimen measures $31\frac{1}{2}$ inches, of which the tail is 7. It is rather surprising to find a new snake in so well explored a locality.

VIII.—*Notes on the Earthquake in the Punjab of March 2nd, 1878.*—

By A. B. WYNNE, F. G. S.

(Read 5th June.)

Earthquakes in the Punjab are not uncommon, but little effort seems to have been made to record their occurrence in any way that might prove useful; indeed as a rule they are neither sufficiently frequent nor pronounced to leave more than a passing impression, though the directions from which the undulations come are occasionally noticeable, and doubtless, with proper appliances, they would form an interesting study.

On the 2nd of last March the most severe shock which has occurred within the memory of the present generation, so far as I can learn, affected the whole of the northern part of the province. With regard to it I have collected a few notes which I offer more as a record of the event than as

* Günther, P. Z. S., 1875, p. 233.

an exhaustive or abstrusely scientific treatment of the subject. Accurate details concerning so large an area are not within the reach of every one to collect, and I have had a little difficulty in learning even so much as I have put together. Some of this information has been derived from personal observation, some from the accounts given by friends or acquaintances, and some from the reports in the "Pioneer" newspaper, and "Civil and Military Gazette."

It may be as well to give the localities from which information has been received in the form of a list, with the hour of the shock, where known, reduced to Madras time,* and the duration of the earth-movement, opposite.

Punjab Earthquake of March 2nd, 1878.

Locality.	Hour felt, (Madras time).†	Duration.	Sound wave.	Authority.
Bannu,	Uncertain,	Uncertain..	None ..	R. Udny, Esq., Deputy Commissioner.
{ Kohát, ..	About noon,	About 2 minutes.	No information.	Major Swinton Browne, 6th P. I.
{ Kohát, ..	Noon, Madras (11-37 Station.)	Uncertain..	Rumbling sound.	Major Ross, 1st Sikhs per Capt. Plowden, C. S.
Pesháwar, ..	About noon,	Over a minute.	Noticed ..	Capt. M. S. Wynne, 81st Regiment.
Naoshera, ..	No details, ....	....	....	Reported.
Hoti Mardán,	No details, ....	....	....	Major Stewart—Guides.
Attock,	About noon,	Over a minute.	Unnoticed..	Capt. C. F. Massy, C. S.
Abbottabad,	Noon,	1 minute, 50 seconds.	Unnoticed..	Personal.
Ráwalpindi,	Immediately after noon.	Over a minute.	No sound ..	Dr. Henderson, Col. Surgeon.
.....	.....	.....	Sound noticed	Mr. P.—
Jhelum,	Noon,	Uncertain..	No sound ..	Buchanan Scott, Esq., R. E.
Murree,	Noon,	$\frac{1}{2}$ a minute to 3 minutes.	Unrecorded	Rev. Mr. Corbyn, Mr. W. L. Holman.
Lahore,	11-56 A. M.,	3 minutes..	....	"Civil and Military Gazette" Mar. 4th, 1878.
Lahore,	About noon? ..	Unrecorded	....	"Pioneer" Mar. 6th, ..
Lahore,	12-50 P. M.?	Unrecorded	....	R. Dick, Esq.
Ferozpúr, ..	Unrecorded,	5 minutes ..	Noticed, loud	Ditto.
Simla,	12 h. 1 m.?	9 minutes ..	Unrecorded	Ditto.
Masurí,	Unrecorded,	No information.	No information.	"Pioneer" Mar. 1878.

* Where the time of the place is unknown to be that of Madras, or the reduction thus rendered doubtful, a note of interrogation is inserted.

† Madras time according to Frontier authorities is 23 minutes faster than the local time kept, by which Station guns are fired.

Days before the greater shock, I felt an earthquake at Abbottabad, February 26th, at 3.40 P. M. It was of the kind usual in these parts, lasted only a few seconds and did no damage. A sharp shock was reported in the "Pioneer" to have occurred at Kángra on the 19th of March (after the greater one), and others occurred in Hazára—on March 29th at 7 P. M.; on April 4th at 6.11 A. M., (a short and sharp one); on April 19th at 5.9 A. M., a more considerable one; on April 21st at 9.20* A. M., lasting about five seconds. That of April 19th was, though short, rather severe yet insufficient to bring down tall chimneys at Abbottabad badly shaken and bulged by the earthquake of March 2nd. The shock of the 21st caused the roof beams of the dák bungalow at Haripur to creak, while on the night of the same day there was a slight shock after midnight at Ráwalpindi.

In all the cases just mentioned except the Kángra one, of which I have no information in point, and that of April 4th, the undulation was more or less clearly felt to be from west to east, as seems to be the case most frequently in the N. W. Punjab, but on April 4th, it appeared to come from north to south. In none, so far as I am aware, was any sound-wave heard, indeed I have only once heard this: some years ago at Murree, when an east and west shock occurred (at about 10 o'clock P. M.) in the silence of the night. I find, however, that a noise was heard in some cases accompanying the shock of March 2nd, 1878, though entirely unnoticed in others, and positively absent at Ráwalpindi, according to a careful observer.

The detailed information, such as it is, which I have been able to collect with regard to this severely-felt earthquake is as follows:—

Earthquake of March 2nd, 1878.

Bannú. The shock was felt here severely and lasted unusually long. This is all the information I can gather.

Kohát. Captain Plowden, Deputy Commissioner of Kohát, replying to a letter, informs me that the shock occurred there at 39 minutes past 11 o'clock A. M., station time, or noon? by Madras. The motion came from the west with a rumbling sound like that of the underground railway-trains, followed by a roll and three sharp shocks: no shocks were observed before or after this earthquake and its duration was not accurately determined.

Major Ross, 1st Sikhs, who gave this information, was bathing at the time, and says the water was driven out of his tub to the height of eight inches or so, and the bath-room seemed to heave like the cabin of a ship at sea.

* All local, not Madras time, for which add 23 minutes.

Several houses and public buildings in the district were cracked and otherwise damaged.

I am informed by another Officer (Major Browne) who was then in Kohát that he felt the shock at about the same time given above, it lasted some two minutes, shook the whole place very violently, so that people left their houses, and it seemed to come from the westward.

A considerable portion of one of the walls of the strongly built Fort of Kohát was thrown down. No accompanying sound was noticed by my friend, and the whole character of the disturbance seems to have resembled that of other places.

Pesháwar. My informant felt the shock here as he was "marching out" with his regiment towards Jamrúd. It occurred at noon nearly, Madras time, (or after 11:30 station time) and he was then about three miles from Pesháwar on the Jamrúd road. A halt having been made, some of the men who were sitting down jumped up, startled by the motion. He noticed that a low rumbling sound immediately preceded the shock: the earth was plainly seen to undulate, and a water-cut beside the road, after the shock had passed, showed a lately wetted margin of two feet or more, consequent upon the transit of a longitudinal wave caused by the undulations. The motion came from the westward in the direction of Jamrúd. Some of the people present felt nausea.

On his return to the station he found the front of his bungalow thrown down. A wall of the fort also fell, and several other houses were damaged. The Barracks escaped, owing to their having been built with iron couplings in the walls, and in the city, from the use of wooden tie-beams in the masonry, because of the damage often done here by slighter earthquakes, the injury done was less than in the Station.

Naoshera. Reports say the shock was severely felt here.

Hoti Mardán. I can only learn that the earthquake-wave here set things which were suspended swinging in an east and west direction.

Attock. At Attock the earthquake occurred late in the forenoon (station time) about noon by Madras. A wall of the Serai or fort was thrown down, and the motion of the earth was strongly felt even by people on foot, by whom a strong shock may often pass unnoticed.

Abbottabad. Here the movement commenced within a minute or so before or after 12, noon, (Madras time) as nearly as I could estimate from the time usually kept at the station. I was lying sick in bed but happened to have my watch in view; there was a palpable undulation crossing my bed from westward to east. At first it commenced with a slight tremor of the usual kind and after a short pause of perhaps 3 seconds, this returned with greatly increased strength. The wall of the room cracked from the crown of the arch over the door to the roof, which being of wooden shingles

creaked and strained so loudly, that I may have been unable to notice any sound-wave. I got up but could only move slowly, and after some delay in securing my watch by which I was noting the time, I reached the outside of the house, and heard the crash of chimneys falling at the neighbouring bungalows, while the stones of the one belonging to the dāk bungalow I had been in, were all shaken asunder, though the chimney (a low one) did not fall. A cup half filled with milk in my room had its contents violently thrown out, and projected nearly to the distance of a foot on each side towards the east and west.

During the shock the vibration was so continuous or so quickly repeated as to seem without intermission after the first one I have mentioned, and the motion died away more gradually than it commenced. I timed its duration as 1 minute and 50 seconds from first to last.

Doctor Grant, then acting Medical Officer of the station, who had left me shortly before, was walking up an inclined open space when the shock occurred; he observed the ground to undulate and the trees to sway about considerably, though there was no wind, he felt a sensation of nausea and found it difficult to walk. Next he saw a man thrown from a ladder and then a cloud of dust rising from the falling wall of a bungalow. On reaching his own he found the wall cracked, also above an arch.

Some time afterwards I was staying at another two-storied house in this station which had suffered very much. Some of the walls were cracked from near the ground to the roof; the cracks passing through weak places, such as openings for windows or doors. I noticed that it was in most cases those walls which ran east and west that were cracked; as if a short wave to which they could not conform had passed longitudinally beneath them.

No one in the place remembered an earthquake of such severity to have occurred before.

Rawalpindi. At this station the earthquake occurred immediately after gun-fire (12, noon, Madras time), possibly a little later than at Abbottabad, but the time kept there is scarcely to be relied upon to a minute. The movement appeared to come from a direction north of west, to judge from the observations of Dr. Henderson, and from the directions in which he found water to have been thrown out of vessels. It lasted for over a minute. Dr. Henderson is certain there was no sound-wave, but another person stated that a low rumbling sound did precede the shock.

Dr. Henderson felt the heaving of the earth very distinctly; his little boy fell down and asked what was the matter with the ground.

Dr. C—— of the 10th Hussars was talking to the Mess Sergeant in the compound of the Mess, he did not recognise the occurrence as an earthquake, but felt sick and walked to a tree for support. On returning a minute or two afterwards, the Sergeant said he too had felt sick, and asked for medicine.

Some of the houses in the station were rent and shaken, and a forge at one of the workshops was thrown down, but the damage done seems to have been less than elsewhere. The place is situated on an open plain and stands upon a considerable depth of sandy and coherent brick clay, overlying highly inclined sandstones and clays, often vertically bedded.

Jhelum. The shock was felt at Jhelum at noon, Madras time. It appeared to come from N. E. and to pass to S. W., and it was unaccompanied by any rumbling sound. It damaged the steeple of the Church near the top, cracking it across and shifting the upper part both by lifting it to one side and turning it horizontally on the base of the broken part, as far as can be seen from below.

The Officer who communicated this thought he must have got a sun-stroke; he was out of doors when the shock occurred and the ground moved, and he noticed an interval after the first, between it and the (?) stronger shock which followed, much in the same way as occurred at Abbottabad.

Murree. In a letter from Murree it was mentioned that the shock was severely felt, and house-property sustained considerable damage: no further details have reached me.

By another letter (from Mr. Holman) I learn that the time the shock occurred was 12 o'clock, noon: its direction so far as he could remember was from south to north.* (From another observer I learn that the direction appeared to be from west or west by south.) Its duration he supposes was about half a minute, though most people said three minutes. (N. B. The average of these would give one minute and three quarters, very nearly the time observed of Abbottabad.)

There were three distinct shocks, the last the most severe, and he only remembers one as bad during a long-continued residence of many years in Murree.

Some damage was done to the station, walls fell, and several chimneys also. One observer heard two distinct loud sounds like volley-firing, which he attributed to the working of the shingle roofs.

Lahore. My information concerning the earthquake at Lahore comes partly from the "Pioneer"—or the local press (Civil and Military Gazette), partly from a friend who was kind enough to make enquiry for me.

From the report in the "Pioneer" of March 6th, 1878, though the shock is said to have been severe, the writer did not himself notice the occurrence at all, but was told of it afterwards, and gives the time as *noon*, presumably Madras time.

In the local paper of March 4th, the time of the shock is given as 4 minutes to 12 o'clock noon. "A continuous vibration of the ground lasted

* The ridge on which Murree stands at an elevation of over 7000 feet runs nearly N. E.—S. W.

for 3 minutes," and the earth "wave appeared to travel from east to west."

One of the gentlemen who wrote to my friend, says, he was sleeping at the time, and being suddenly awakened by the earthquake, he ran into his bathroom to observe the tub. In this, the water was oscillating and had wetted its sides 5 inches vertically above the level shown when at rest. Hanging plants and a bird cage in the verandah set in motion by the earth-wave swung to the north and south, a direction corresponding to that marked by the water in the tub.

As to duration the same observer thinks the time given in the local paper excessive, and that it could not have been many seconds, perhaps 30. He does not state that any sound-wave was heard.

A wall in his house was cracked and the filling of an archway showed a complete separation all round the arch. In the city many old houses fell and one in falling was reported to have killed three men.

Mr. Scott, R. E. of Jhelum, heard from Lahore that two friends playing at billiards in the latter station observed a N. E.—S. W. oscillation in the lamp-frame above the table, on the occurrence of the shock, which took place at noon, the same time as in Jhelum.

Ferozpur. Although at Lahore the earthquake passed unnoticed by at least one person, in a station so near as Ferozpur, according to a correspondent of the "Pioneer," something like a panic occurred. He writes—"The first shock was quite violent enough to cause a very sensible movement on the earth's surface, and the dull rumbling noise was so unusually loud as to attract general attention. Half a minute after came the second shock, a very rude one indeed, making floors upheave, walls oscillate, and beams and rafters start and crack. Every one rushed into the open air only to find the ground shivering under their feet. The third shock was gentler, the tremor of the earth, however, continued for a long time, and it was fully five minutes if not more from the beginning of the first shock till the last trembling passed away. No buildings fell, but many beams were started, and some walls were cracked."

The time of the first shock is not given.

Simla. If Madras time is kept at this station, as seems probable, the shock was felt there at the same general time as elsewhere, *i. e.*, one minute past 12, noon. See "Pioneer" March 6th, 1878. The reports in this paper say, the earthquake shook Simla to its foundations, and was one of the longest continued ever known there. "The wave or movement came first from east by south and lasted for about a minute, when it shifted to north-east, and increased in intensity from a tremor to a roll, the shocks occurring without intermission for nine full minutes, the last being at ten minutes past noon. It was the third shock within six months, each being severe."

The coincidence apparent as to time would seem to identify the shocks

here as part of the same earthquake felt in the other places mentioned, but the directions and duration are so very different as to suggest that the undulation, if generated near a line reaching from the Simla portion of the Himalaya, towards and beyond Pesháwar, met with some resistance or disturbing force by which it was deflected or even reflected, and its effects rendered cumulative, so that the shock was felt for a greatly longer period.

Masúrí. An earthquake shock at Masúrí is so mentioned in the "Pioneer" as to render it presumably that of March 2nd, and as a result it is stated that springs had ceased to flow.

The following table of the directions from which the shock was felt to come at different places may be useful.

Kohát,	}	From the west.
Pesháwar,		
Hoti Mardán,		
Abbottabad,		
Murree,		From the south ?
Ráwalpindi,		From west by north.
Lahore,		Uncertain.
Simla,		From south of east and north-east.

It will be seen from these brief notes that the effects of the shock of March 2nd were more or less forcibly felt over the whole of the Upper Punjab and neighbouring regions. The space being so large, the most favourable conditions for observing earthquake phenomena—*i. e.*, constant homogeneity and elasticity of the rocks forming the earth's crust—could scarcely have been expected. Mountain regions being exceptionally unfavourable from the form of the ground and liability to variety of formations, fissures, planes of displacement &c., much disturbance of the earth-wave, and variation of effect might have been anticipated ; and yet it would appear that the shock must have been almost simultaneously felt along the whole western outer Himalayas and their continuation, from Masúrí to Pesháwar, in a direct line some 455 miles apart.

Assuming 30 miles a minute to be a high rate for transmission of an earthquake wave (Mallet, Admiralty Manual of Scientific Enquiry) and that this shock originated near either Pesháwar or Masúrí the passage of the wave from one station to the other would have occupied about 15 minutes, and it should have been observed so much later at one of these places, which would perhaps be a large error to attribute to the time recorded. But if the shock started from a point near midway between and occupied half the time in reaching these points almost simultaneously, then a smaller error of time would be both possible and difficult to detect from the records at hand. There is, however, no information available regarding the earthquake from the vicinity of Kishtwár, which would be about half

way in the Himalayas, though at Lahore, nearly in the same relative situation, on the plains, the time given is "*about noon*" according to observations made, or the same as at either extremity of the region known to have been disturbed.

However these considerations might indicate a seismic centre among the mountains somewhere on the Simla side of Kashmir, the observed motion of the undulations both at Simla and towards Pesháwar are against the supposition of such an origin, even though a considerable amount of this motion be attributed to secondary vibrations masking the main earth wave.

If the disturbance had one common source, and if the *primary* undulation reached the earth's surface at almost the same time at all the widely distributed points indicated, it may perhaps be a legitimate deduction that the place from which it originated was very deep-seated, or else that the conditions of the earthquake were somewhat peculiar and the disturbances were initiated along an extended line rather than at any particular point.

It will be noticed that the greatest differences in the results, so far as the information collected extends, took place at Simla, Lahore, and Ferozpur; differences both in the duration and direction of the motion* which would render further information most desirable, and it will be observed that this disparity coincides in a way with the marked general change in the alignment of the mountain ranges. All the stations close to the outer Himalaya in the upper Punjab, whence I have obtained any details, stand among or adjacent to ranges belonging to the east-west, or west-by-south system, prevailing on the Pesháwar side of the Jhelum valley, while Simla and Masúrí are upon or near ranges having the north-westerly bearing common to the main direction of the western Himalayan chains. On the supposition that the earth-wave travelled from the west as indicated by so many of the upper Punjab observations, it would have passed longitudinally amongst the western mountains and under the adjacent Ráwalpindi plateau towards the east as far as the Jhelum valley sinus, and, meeting the oblique ranges beyond, might have manifested itself in a different manner.

The varying geological structure of the whole region does not appear to have appreciably influenced the results of the earthquake's manifestation at different places. Pesháwar stands in an alluvial plain; Attock close to the edge of the Indus flats (at their junction with, but more correctly,) upon a mass of slates. Abbottabad is close to, if not actually traversed by, a long line of fault having a very large (unestimated) displacement and

* In the case of Murree my informant seems rather uncertain, as to the direction, but my Lahore information is positive as to this being N. and S. though from which is not stated.

cutting off limestone mountains from others formed of slate. Ráwalpindi is on a plateau formed of tertiary rocks, alternating sandstones and clays, just there nearly vertical and horizontally overlaid by post-tertiary and perhaps even newer clays, sands, and boulder-beds. Lahore and Ferozpur are on the alluvial Punjab plains.

In most of these places, the shock occurred at the same time, as nearly as can be judged, and its results were similar, whether it lasted under two or as much as five minutes.

Kohát, close to east and west ridges of limestone or of sandstone, and standing upon a stony detrital deposit at the mouth of the Hangú valley, is about 80 miles due west of Ráwalpindi: in both places the undulation approached from the westward, in the latter more nearly west-north-west.

Simla is entirely differently situated from these stations; at a great elevation and nearer to crystalline masses which would probably afford a better conducting medium for the earth-waves. Yet here the time of the occurrence was presumably the same as elsewhere, and though the movement is said to have come from opposite directions and to have lasted fully nine minutes, I have no evidence that the damage caused, which would be a measure of the force exerted, was at all greater than at Abbottabad or other localities.

I have heard it more than once observed that these Punjab earthquakes usually occur after rain has succeeded a spell of fine weather; indeed Dr. Henderson tells me that from this he predicted the occurrence of the earthquake previous to that of March 2nd, felt at Ráwalpindi as well as by myself in Hazára. With reference to this point it should be remembered that the nine distinct shocks which I have mentioned as having recently occurred in the Punjab within fifty-three days, have followed a season of excessive rainfall preceded by an exceptionally and disastrously dry summer.

Whether the access of meteoric water by gravitation through the rocks to hotter regions below be a sufficient cause in the present case for the phenomena observed, or a better one can be suggested, I must leave for the enlightened consideration of competent seismologists; and though several minor shocks are not unusual attendants upon a greater earthquake, I venture to suggest that something exceptional in the way of cause must have occurred to account for the greatly increased frequency of late of the earthquakes in the Punjab, where they have rarely taken place more than once in a twelvemonth, at least for the last nine years: and also for the greater than usual intensity which has marked one of them, almost simultaneously felt over an area, which may be roughly estimated at 67,000 square miles.

IX.—*Notes on the land and fresh-water shells of Kashmir, more particularly of the Jhilum valley below Srinagar and the hills North of Jammu,—*
By W. THEOBALD, *Geological Survey of India.*

(Received 27th June ;—Read 3rd July, 1878.)

The present notes embody the results of a hasty traverse of the ground from Mari to Srinagar and thence *viâ* the Mohu pass to Jammu, during the very unfavourable months of March and April last year, and it is to be hoped that the rather meagre list here given may be hereafter enlarged very considerably by others who may have more leisure, and a more favourable season for their investigations than I could command.

In the list of Kashmir mollusca appended to these notes, an asterisk marks those species not obtained by myself personally.

MELANIA TUBERCULATA, Müll.

A small race of this widely spread shell occurs in the outer hills.

VALVATA PISCINALIS, Müll.

Abundant on the river mud in pools under the 'Travellers' Bungalow at Soper.

BITHYNIA PULCHELLA, B.

Common in the valley.

HYALINA LUCIDA, Drap.

H. FULVA, Drap.

Both species occur on the Panjâl range and are common in the debris of streams running into the valley.

MACROCHLAMYS INDICA, B.

M. vitrinoides, auctorum (*non vera*).

M. petrosa, Hutton.

This widely spread species is rather rare in the outer hills. A single mature shell only was met with, much smaller than the type, and measuring only $18 \times 15 \times 7$ mm. An immature shell was a trifle larger.

M. SPLENDENS, Hutton.

Colour bright chestnut, with a lustrous polish. My largest shell is not quite adult, and measures $15 \times 13 \times 8$ mm. A dead adult shell is a trifle smaller. It shows the mouth very oblique and shaped much as in *M. aspidēs*, with the lip thickened inside as in *Hemiplecta monticola*. This species occurs rather plentifully in places above Uri, nestling under stones.

M. PATANE, B.

A few dead specimens of what seems a small race of this species were obtained above Uri, one specimen measured $9 \times 7.7 \times 5$ mm.

MACROCHLAMYS, sp.

A single dead shell of a species resembling *M. levicula* was found with the last, above Uri, measuring $6 \times 5 \times 4.5$ mm.

KALIELLA BARRAKPORENSIS, Pfr.

A single specimen of this widely spread species, measuring 6 mm. in height, was found in Kashmir. The specific name is badly chosen, as this is a hill species, (not found on the plains, unless transported on plants), and ranges throughout the Himalayas and also the mountain ranges of Southern India.

HEMIPLECTA MONTICOLA, Hutton.

H. labiata, Pfr.

Generally distributed throughout the Western Himalayas. In the valley of the Bichlári river, an affluent of the Chináb, this species occurs remarkably fine and in incredible numbers in the fissures of rocks, though few live specimens were procurable at the time of my visit. The colour of the shell is dark chestnut both above and below, and there are four or five prominent pale bars or transverse stripes, marking the seasonal arrest of growth and the position of successive epiphragms, formed during the period of hybernation. The epidermis is very thin and pale yellow, and the shell does not attain maturity under seven or eight years. The first five whorls are minutely shagreened, the remaining ones smooth but more or less transversely rugose.

My largest specimen measures $47 \times 39 \times 23$ mm. The species is particularly common below Nachilana in the Bichlári valley.

H. JAMUENSIS, n. s.

Aspectu inter H. monticolam et H. ligulatam. Testâ solidâ, convexâ, anguste umbilicatâ, supra levissime granuloso-corrugata (H. ligulatæ modo) subter lævigatâ. Colore supra pallide brunneo, subter albido. Anfractibus sex, lente crescentibus. Labio intus incrassato, simplici. Attinet ad $27 \times 23 \times 14$ mm.

Habitat in valle Jawi, inter Chineni et Adampur.

This species might be regarded by some as an impoverished race of the last, from which I have little doubt it is proximately derived, but it differs too much in size, colour, form, and range to be properly united therewith. Mr. W. Blanford suggests it may be the *H. monticola* of Pfeiffer, which is very likely. I have unfortunately no live shells, but the type of colouration in my best specimens is more of the type of *ligulata* than of *monticola*, being white below. It is I think clearly a species descended from *H. monticola*, and modified to meet the climatal conditions of the Jawi valley below Chineni, where the winter cold and summer heat are both more intense than is suitable for *monticola* on the one hand, or *ligulata* on the other.

TROCHOMORPHA HYBA, B.

Two dead adults and a living half grown shell were obtained by me on the hills behind Aijas, to the east of the Walar lake. The largest specimen measured $17 \times 16 \times 11$ mm. It recalls the Nilghiri *Thyssonota guerini*, but the animal belongs to the *Zonitidæ*.

This species occurs occasionally in thickets between Dalhousie and Chamba between 6000 and 7000 feet above the sea.

HELICARION FLEMINGII.

This species is not rare in the outer hills and two distinct races are discernible: the one (*a*) being confined to the higher and moister hills, whilst the other (*b*) occupies the warmer valleys and the drier ranges of less elevation.

a. My finest specimens of this race are from near Mari (Murree) where they were collected by my colleague Mr. Wynne. The finest measure $42 \times 31 \times 20$ mm., though shells rarely attain this size. Shells of the ordinary dimensions of 35 mm. are not rare in parts of the Jhilm valley about Uri, and even among the outer hills, and occur subfossil in the valley deposits (clays) in many places outside the main ranges and in the Suttlej valley. The reputed locality of the type, 'Sind', is open to considerable doubt, unless the specimen was imported in a plant case. In five specimens the lower part of the shell is lustrous, whilst the upper half has a dull silky sheen, from innumerable fine *striae* which cover the surface.

b. This race runs considerably smaller than the last, the largest specimen of some hundreds measuring $22 \times 17 \times 12$ mm. It is a miniature of the last, and occurs abundantly in the Chináb valley above the junction of the Bichlári river and also at Dharmśála in the Kángra valley. The shell is almost wholly enveloped by the mantle when the animal is in motion.

There is yet another race which may perhaps prove a distinct species, but which at present I prefer to consider as a variety of the larger form of *H. flemingii*, and which I will term provisionally:—

c. var. *altivagus*. Of this form I have only a few dead shells. The largest measures $31 \times 23 \times 14$ mm. and it differs from the type by being much flatter. I only met with it sparingly above Uri.

H. SCUTELLA, B.

Sparingly distributed in the Western Himalayas at moderate elevations. The body delicately arched, like the outline of a triton's tail. This species occurs with the small race of *H. flemingii* both in the Chináb valley and at Dharmśála though nowhere so numerous.

H. MONTICOLA, B.

There is some confusion between this species, the last, and the next, which, without more information, I cannot clear up. Specimens received

by me from Benson under this name were certainly closely allied to the last. In the *Conchologia Indica*, however, a very different shell is figured (Plate CLII, figs. 1, 4,) and one which seems barely distinct (save in size only) from *H. cassida*, Hutton, also given on the same Plate. My coadjutor, Mr. Hanley, purchased most of Benson's types, but has most unfortunately not said if the figure is taken from one of them.

My own impression is, that *H. monticola*, B. is a near ally of *H. scutella*, B. and that the *monticola* figured in the *Conchologia Indica* is a mere immature specimen of *H. cassida*, Hutton. It is true the shell is said to be in one 'dull' in the other 'lustrous', but this may be the result of its condition, as in *H. flemingii*, the lustrous surface of the shell is covered with a dull epidermis, which in *scutella* is wanting, and I was much struck with the presence of this dull epidermis, as it is covered by the mantle; the shells of other *Zonitidæ* under such circumstances being usually lustrous.

H. CASSIDA, Hutton.

A single adult specimen of what I consider this species was taken by me under a stone above Uri. Two young shells (one of them forwarded to me by Mr. Lydekker) also seem to belong to this species, though the mouth is rounder and deeper than in the adult (*vide* *Conch. Indica*, Plate CLII, figs. 2, 3). This species might almost be ranged in *Paryphanta* and would seem to be rare as I have only seen the above three specimens.

VALLONIA PULCHELLA, Müll.

V. COSTATA, Müll.

The higher ranges.

FRUTICICOLA HUTTONI, Pfr.

Widely distributed, but individuals do not seem anywhere numerous.

PERONEUS CENOPICTUS, Hutton.

Widely distributed and individuals numerous. In the North-western Punjab, this species harbours under stones, and is variable in size.

NAPÆUS CANDELARIS, Pfr.

N. domina, B. This is a common species being found about Mari and in various places in Kashmir, usually above 6000 feet, but occasionally lower. Sinistral shells are most numerous, but dextral ones also occur not rarely. My largest sinistral shell measures 35.6×9.2 and my smallest 27.7×8.7 mm. The dextral shells are smaller, ranging from 33×8.8 to 24×8.5 mm.

The shells vary somewhat in a large series, in tumidity and in the attenuation of the spire, and even in the number of whorls, a remark which applies to all the species of the genus, and proves the risk of creating new species from single examples.

I do not think that *N. domina*, B. can be separated, as the main distinction seems to be in the texture of the shell; but in this group the texture varies from horny and sub-diaphanous, in which the striped markings are conspicuous, to creamy porcellanous, in which they are more or less if not wholly obsolete. The difference too in this respect is considerable between the living and dead shells, and largely depends (unless I am much mistaken) on the conditions of climate and alimentation under which the animal lived.

A slender form is seen in places, with a thinner shell than the type, and indicating a passage to *N. kunawarensis*, Hutton. A typical example of this variety measures 26.5×8 mills.

In the above and in all the measurements which follow the short axis is measured just behind the aperture.

N. SINDICUS, B.

Of this species both dextral and sinistral shells occur, the former most numerous. The size ranges between 27×8 and $17 \times 3 \times 6.6$ mm. for dextral shells and 22×7 and 18.2×6.2 mm. for sinistral ones out of a large series. It occurs abundantly in the Jhilum valley about Chatur, (above Kohala) at low elevations, and elsewhere less commonly up to 3000 feet or thereabouts.

N. CÆLEBS, B.

This is a forest species, usually ranging from 5000 feet upwards. It is the most variable species of the group, both as regards size and form ranging from 22×8 to 14×6.2 mm. Some systematists might easily make six or eight species out of the varieties of this shell; but with a large, but by no means exhaustive, series before me, I cannot venture to specifically separate the very variable shells which a large series displays. I have never seen a sinistral specimen, but *N. boysianus*, B. looks like a sinistral example of the largest form of *cælebs*.

N. ARCUATUS, Hutton.

Kashmir specimens range between 2×6.1 and 13.7×5 mills. A single dextral shell found by me measures 12×4 mills. It does not seem a common species. The habitat 'Moulmein' given in the *Conchologia Indica* is of course absurd, but for this and similar blunders I am nowise responsible, since the publishers declined to furnish me with proofs, as the work went through the press.

N. SEGREGATUS, B.

A single specimen of what seems a variety of this shell was found, but it had an abnormal look about it. It measures 11.2×5 mm and has the ordinary horny appearance of *cælebs* and its allies. A smaller form, var. *pusillus*, would seem to belong to this species and is far from rare on the Chináb valley above 6000 feet. It only measures 9×3.8 mills.

N. PRETIOSUS, Cantor.

The type was obtained near the Jhilum on the well-contested battle-field of Chilianwalla. The species also occurs sparingly throughout the Jhilum valley below Uri, but is nowhere common except about Kathai fort on the right bank, where it is abundant, though I saw only dead shells. The range of this species must be very limited, as I have not noticed it to the eastward, or anywhere in the cis-Rávi country.

N. SMITHII, B.

An occasional individual of what I take to be this species, is here and there met with in the Jhilum valley below Uri, but I have only seen dead shells. It also occurs at Mari, where I have seen a few specimens, a trifle smaller than the type. My best specimen measures 11.1×3.5 mm. and exhibits the characteristic dilatation of the peristome.

N. RUFISTRIGATUS, B.

Common on the outer hills from the Jumna to the Indus. Closely allied to this species and with difficulty separable in a large series, are *N. eremita*, B., *N. indicus*, B., *N. salsicola*, B. and *N. spelæus*, Hutton, these two last forms being erroneously placed in my Catalogue (Thacker and Co., 1876,) under *Cylindrus*.

OPEAS GRACILIS, Hutton.

The outer hills bordering the plains, but not noticed in the valley.

CYLINDRUS INSULARIS, Ehr.

The outer hills and plains.

PUPA MUSCORUM, L.*P. GUTTA*, B.

Both these species no doubt spread over the higher ranges of Kashmir, though the type of the latter species has only been taken by me in Spiti.

P. HIMALAYANA, B.*P. HUTTONIANA*, B.

Both these species occur abundantly on the Panjál range and in the debris of streams flowing therefrom, whence they are carried down during floods into the plains.

P. — sp.

A single specimen of a *Pupa* somewhat of the *plicidens* type occurred in the Jhilum valley with numbers of the last two species. I do not know it, but hesitate to describe it as new, till it has been compared more fully than I have at present means of doing.

Alt. 2.5 mm.

CLAUSILIA CYLINDRICA, Gray.

I did not take this species in Kashmir, but as I took it in Dharmasála a little east of the Rávi, I have no doubt that it should be included in the Kashmir fauna.

C. WAAGENI, Stol.

A single dead shell of what is probably this species was found by me a little below Rámpur the first stage below Baramula. The type was found near Mari, and it doubtless ranges into Kashmir in suitable localities.

ENNEA BICOLOR, Hutton.

The outer hills, where it is almost invariably associated with *Opeas gracilis* and *Peronæus cænopictus*.

CÆLOSTELE SCALARIS, B.

GEOSTILBIA BALANUS, B.

Both these species are found in the outer hills bordering the plains, the former rather rarely.

LYMNÆA.

The species of this genus do not call for remark.

PLANORBIS.

Several small species of this genus, which my opportunities did not allow of my recording, have no doubt to be added to the Kashmir fauna.

CORBICULA KASHMIRENSIS, Desh.

My largest specimen, from near Soper, measures $45 \times 39 \times 23$ mm. Smaller specimens occur lower down the Jhilum near Baramula.

C. OCCIDENS, B.

Accompanies the last. My largest specimen measures $21 \times 17.5 \times 11.5$ mm. In Kashmir specimens the rufous rays (which Hanley says are rarely present) are rarely absent, but never very strongly marked and sometimes with difficulty visible.

SPHERIUM INDICUM, Desh.

PISIDIUM HYDASPICOLA, n. s.

Testâ sub-cordate ovali-tenui, exilissime striatâ, antice rotundatâ, postice vix truncatâ $4 \times 3.4 \times 2.5$ mm.

Habitat valle Kashmirense, in fluminibus ad Hydaspem fluentibus, prope Shypion.

The nearest ally of this species is *P. clarkeanum*, Nev., but it is more rounded in front and hardly truncated behind.

A single specimen only was found in the stream near Shypion, a feeder of the Jhilum.

The above is a very imperfect list of the shells of so diversified a region as regards surface and climate as Kashmir. The correct determination of the smaller fresh-water species of *Bithynia* and *Planorbis*, and of the species of *Sphærium* and *Pisidium* which almost certainly occur is difficult. *Unio* I have not noticed in the valley.

At page 41 of my Catalogue of Indian shells, I have given the Pûnch Hills as a habitat of the operculate *Megalomastoma funiculatum* of Sikkim,

on the authority of shells received from Mr. Lydekker with that habitat, which subsequent enquiry has served to render extremely doubtful, and I have accordingly excluded the species from the Kashmir fauna.

In conclusion I would urge that visitors to Kashmir could hardly fail to add many species to the above list if they carefully collected in the higher ranges, and along routes not visited by me, especially the smaller species of *Pupa*, &c. which are most conveniently sought for among the light *rejectamenta* and vegetable refuse swept down by floods, and heaped up along the banks of streams in sheltered spots.

List of land and fresh-water shells, presumably inhabiting Kashmir and its vicinity. Shells, not seen by me, marked by an asterisk.

Paludomus tanjoriensis, Gmel.*

Melania tuberculata, Müll.

M. variabilis, B.*

Valvata piscinalis, Müll.

V. stoliczka, Nevill.* (Cat. Moll. Ind. Mus.)

Vivipara bengalensis, Lam.*

V. dissimilis, Müll.*

Bithynia pulchella, B.

Hyalina lucida, Drap.

H. fulva, Drap.

Macrochlamys indica, B.

M. splendens, Hutton.

M. patane, B.

M. sp.

Kaliella Barakporensis, Pfr.

Hemiplecta monticola, Hutton.

H. jamuensis, Theob.

Trochomorpha hyba, B.

Helicarion cassida, Hutton.

H. flemingii, Pfr. (type and *var. minor*.)

H. flemingii, *var. altivagus*, Theob. (an sp. nov.?)

H. monticola, B.

H. scutella, B.

Fruticicola huttoni, B.

Vallonia pulchella, Müll.

V. costata, Müll.

Peronæus cænopictus, Hutton.

Napæus candelaris, Pfr.

N. indicus, B.

N. cælebs, B.



- N. arcuatus*, Hutton.
N. pretiosus, Cantor.
N. segregatus, B.
N. smithii, B.
N. rufistrigatus, B.
N. vibex, Hutton.
Cylindrus insularis, Ehr.
Pupa muscorum, L.
P. gutta, B.
P. himalayana, B.
P. huttoniana, B.
P. sp.
Succinea pfeifferi, Ross.*
Olausilia cylindrica, Gray.
C. waageni, Stol.
Ennea bicolor, Hutton.
Opeas gracilis, Hutton.
Zua lubrica, Müll.*
Glessula huegeli, Pfr.*
Cælostele scalaris, B.
Geostilbia balanus, B.
Carychium indicum, B.*
Lymnæa luteola, Lam.
L. peregra, Müll.
L. stagnalis, Müll.
L. auricularia, Müll.
L. truncatula, Müll.
Planorbis calathus, B.*
P. exustus, Desh.
P. carinatus, Müll.
Corbicula kashmirensis, Desh.
C. occidens, B.
Sphærium indicum, Desh.*
Pisidium hydaspicola, Theob.
-

(Received and read March 6th, 1878.)

The mammals described in the following notes are from two collections. The first and largest was made by Mr. W. Davison for Mr. Hume, to whom I am indebted for the specimens; the second, which although smaller, comprised several very interesting forms, was collected by Mr. Limborg. The bats procured by the latter have already been described by Mr. Dobson.*

In addition to the Tenasserim specimens, Mr. Hume has very kindly given to me a large portion of his mammalian collection, and has entrusted me with the whole for examination and description.

Gymnura rafflesi.

This species was mentioned in Mr. Blyth's list of the mammals of Burma,† as probably existing in Mergui, although its occurrence within British limits had not been recorded. It has since been obtained at Báńka-sún in Southern Tenasserim, by Mr. Davison, to whom I am indebted for a perfect female in spirit. The anatomy of the animal is almost unknown, but I hope to induce a more competent anatomist than I am to examine the specimen.

* J. A. S. B. 1877, Pt. 2, p. 312.

† J. A. S. B. 1875, Pt. 2, extra number, p. 32.

skins which I have examined. The extent of the white varies so much that it is not at all improbable that specimens wholly white or wholly black may occur. The fine woolly under fur is dusky olivaceous at the base, brown at the tips on the upper parts, ashy with brownish ends beneath. The terminal portion of the tail is compressed, and in some specimens partially or wholly white in colour, and the under surface of the tail is thinly clad throughout with scattered short bristles, about a quarter of an inch long. These bristles are wanting on the upper part of the tail, which has very much shorter scattered hairs. The small scales covering the tail are indistinctly arranged in rings, and subimbricate; on the lower surface the scales are convex and distinctly imbricate, the bristles arising from the interstices. Thus the under surface of the tail is very rough and may probably be of use to the animal in climbing.

The characters of the tail just mentioned do not appear to have been noticed in the published descriptions of *Gymnura*, all of which are probably copied from that by Horsfield and Vigors. Another important difference from the original account is to be found in the claws of the specimens before me not being retractile. In the original description* the retractility of the claws is mentioned, both in the Latin characters and in the English note pointing out the distinctions between *Gymnura* and *Tupaia*. It is possible that the Tenasserim animal differs from that found in Sumatra, but the distinction between retractile and non-retractile claws would in all probability be of generic importance, and it is difficult to conceive that two genera of insectivora, so closely resembling each other in their very peculiar external characters, and yet differing in so important a detail, should inhabit two regions of which the fauna is, for the most part, identical. At the same time it is possible that I am mistaken in referring the Tenasserim animal to *Gymnura rafflesi*.

The following are the dimensions of the female specimen in spirit—

	inches.
Length from nose to anus,	12
„ of tail,	8.5
„ of ear from orifice,	0.94
„ of tarsus and hind foot (claws not included),	2.15

The stuffed specimen is nearly the same, except that the tail is rather longer. The dimensions given by Horsfield and Vigors for an adult are rather more;—head and body 14.25 inches, tail 10.5, whilst the tarsus is stated to be only 2 inches long, but the difference is trifling.

Mr. Davison informs me that *Gymnura* is purely nocturnal in its habits, and lives under the roots of trees. It has a peculiar and most offensive smell, not musky, but rather alliaceous, resembling decomposed cooked

* Zool. Jour., III, p. 248.

vegetables. There is a slight smell in the dried skin. The contents of the stomach in the spirit specimen appear to consist entirely of remains of insects, amongst which I can, I think, detect termites, but most of the fragments are too much broken for identification.

Tupaia peguana.

Jerdon, Mam. Ind. No. 88 :—Blyth Mam. Burm. No. 65.

Blyth in his Catalogue of the Mammalia in the Museum of the Asiatic Society classed the Peguan *Tupaia* as a variety of *T. ferruginea*, but in his Mammals of Burma he separated the Burmese species, as Jerdon had done. He, however, pointed out that the two are barely separable, and that a ferruginous tinge is present in some Burmese specimens.

Skins collected by Mr. Davison in Southern Tenasserim have all the posterior portion of the back distinctly ferruginous. Others from Myáwadi, west of Moulmain, are almost equally rufous on the rump, whilst other specimens again from the same neighbourhood have no rufous tinge. A specimen from Tavoy has scarcely a trace of rufescent. Without a larger series of Malaccan specimens than I have at hand, I cannot positively say that the two forms pass into each other, but I am strongly disposed to suspect that they do so.

The following dimensions taken on the animals when recently killed are recorded by Mr. Davison on his tickets.

	1 ♂ ad.	2 ♂ ad.	3 ♀
Nose to anus,	6·8	6·8	6·6
Tail from anus,	7·	6·8	6·4
Hairs at end of tail,	1·1	1·2	0·8
	—	—	—
Total	14·9	14·8	13·8
Length of fore foot (claws excluded),	0·88	1·	0·9
„ hind foot („),	1·65	1·75	1·69
„ of ear externally,	0·3	0·2	0·35
„ „ inside from orifice,	0·6	0·55	0·45
Breadth of ear laid flat,	0·8	0·7	0·6

No. 1 is from Kaukaryit on the Houngdarau river, 2 and 3 from the neighbourhood of Myáwadi, all localities to the eastward of Moulmain.

CARNIVORA.

***Prionodon maculosus*, Pls. VI, VII.**

W. Blanf. Proc. As. Soc. Bengal, March 1878, p. 93.

P. affinis *P. gracili*, sed major, atque maculis fasciisque fuscis majoribus ornatus; dorso nigrescenti-fusco, lineis sex albis angustis transfasciato, fasciâ albâ laterali utrinque post aurem oriente, usque ad femorem decur-



rente, lateribus maculis longis fuscis superne majusculis, subtus minoribus signatis, collo sursum duobus fasciis latis subnigris longitudinalibus, inter se vittâ albâ angustâ, medio fusco-lineatâ, discretis, notatâ; caudâ annulis septem fuscis albisque alternis circumdatâ, illis fere duplo latioribus, apice albescente.

Long. a rostro ad anum 18.25, caudæ sine pilis ad apicem 16, pilorum 0.75, tota 35; cranii 3, tarsi a calcaneo 2.8 poll. angl.

Hab. in provinciâ Tenasserim, (Davison, Limborg).

Upper part brownish black broken up by greyish white bands, lower parts white, tail brownish black with 7 white rings, tip whitish. Two broad black bands run down each side of the upper part of the neck, between them is a narrow greyish white band with a faint mesial dark streak, somewhat interrupted, and passing into two bands of elongate spots between the shoulders. The two broad dark bands pass into the dark patches of the back; on each side of these bands is a white rather wavy stripe, commencing at the ear and continued along the neck, above the shoulder, and down the side to the thighs, becoming more irregular behind; below this again is a dark band somewhat broken up into spots in front, passing over the shoulder, and continued as a line of large spots along the side. The back is chiefly brownish black, crossed by six narrow transverse whitish bands, the first five equidistant, the foremost communicating with the mesial neck band, and the hinder all uniting with the white band on the side, so as to break up the dark colour into large spots. There are small black spots on the fore neck, lower portion of the sides, and outside of the limbs, the spots on the fore neck forming an imperfect gorget. The white rings on the tail are not much more than half the breadth of the dark rings; the last dark ring, near the tip, and the first white ring are narrower than the others. Nose dark brown mixed with grey, a dark ring round each orbit with a streak running back to below the ear and another passing up to the crown; forehead between and behind the eyes, and in front of the ears, and cheeks, pale grey. Ears rounded and clad with blackish hairs outside and near the margin inside, a few long pale hairs on the inner surface of the ear conch. Whiskers long, extending to behind the ears, the upper brown, the lower entirely white. Soles, except the pads, which are naked, covered with fine hair.

The fur is soft and short throughout, that on the upper parts is ashy grey at the base; lower fur very fine, tips of the longer hairs black or white; none of the hairs are more than half an inch long on the back, being much shorter than in *P. pardicolor*.

The following dimensions are taken on a fully adult male specimen preserved whole in spirit. The length of the body would perhaps be an inch or two more in a fresh specimen, the other dimensions are probably unaltered.

	inches.
Length from nose to rump over curve of back,	18.25
„ of tail without the hairs at the end,	16.
„ of hairs at end of tail,	0.75
	<hr/>
Total	35.
Length from nose to rump in a straight line,	16.75
Height at shoulder* about,	6.
Hind foot and tarsus from toe to tarsal joint,	2.8
Length of ear from orifice,	1.05
„ „ from base of helix,	1.1
„ „ outside from crown of head,	0.65
„ from orifice of ear to eye,	1.2
„ from anterior angle of eye to nostril,	0.97
Longest whisker,	3.6

The skull of the same specimen measures :

	in.	metre
Length from occipital plane to anterior end of premaxillæ,...	3.	.076
„ from inferior margin of <i>foramen magnum</i> to do.,.....	2.9	.073
Greatest breadth across zygomatic arches,	1.5	.038
Breadth of brain case at posterior termination of zygomatic arches,	1.	.025
Least breadth of brain case behind post-orbital processes, ...	0.45	.0115
Length of suture between nasal bones,	0.62	.015
„ of bony palate from opening of posterior nares to incisors,	1.4	.035
Breadth between posterior molars,	0.53	.013
Length of mandible from angle to symphysis,	2.05	.0515
Height of ditto,	0.8	.020

The stuffed skin was most carefully set by Mr. Davison himself, the dimensions being made exactly the same as those taken on the body before skinning. The present measurements are—nose to insertion of tail 19 inches, tail with hair 16½ in., total 35½, nearly the same as in the specimen in spirit. It is probable that this skin also has contracted a little in drying.

This species appears well distinguished from *P. gracilis* and *P. pardicolor* by its larger size, and by the much greater prevalence of dark colour on the upper surface generally. In external characters *P. maculosus* is nearer to the Malay species, *P. gracilis*, the Himalayan *P. pardicolor*

* Measured from the posterior foot pad to the top of the back between the shoulders, the leg being straight.

having the upper parts covered with comparatively small spots, and more numerous rings on the tail.* With *P. gracilis* I am only acquainted by description and figures.† Judging by these, the principal difference in the colouration is that, in *P. gracilis*, the pale tint prevails very much more than in *P. maculosus*, the upper parts of the former being marked by irregularly shaped blackish spots on a pale ground, whereas the upper surface of the latter is dark, with a few white streaks dividing the colour into patches. On the tail of *P. gracilis* the dark rings are represented as narrower, and, towards the tip, much narrower than the white rings, and there is a long white tip. In *P. maculosus* the dark tail rings are nearly twice as broad as the light, and the white tail tip is very short, shorter than the last dark ring. The distribution of colour on the head also appears different, the whole nasal region in front of the eyes being dark in *P. maculosus*, but not in the figure of *P. gracilis*. The more important dimensions of *P. gracilis* as given by Horsfield are ; length of the body from the extremity of the nose to the root of the tail 1 ft. 3½ in., length of tail 1 ft. ½ in. It is probable these measurements are from a stuffed specimen, but the much smaller size of *P. gracilis* is shewn by the dimensions of the skull given by Dr. Gray‡ whose measurements of the two species *P. gracilis* and *P. pardicolor* are the following. Those of *P. maculosus* are appended for comparison.

	<i>P. gracilis.</i>	<i>P. pardicolor.</i>	<i>P. maculosus.</i>
Length of skull,	2" 7"§	2" 6"	3"
Width at brain case,.....	11"	10½"	1"
Width of zygomatic arch,	1" 3¼"	1" 2½"	1" 6"

This gives the idea that the skull of *P. maculosus* is longer and that the breadth across the zygomatic arches is greater in proportion to the width of the brain case than in the other two species, and judging from an imperfect skull of *P. pardicolor* in my possession, this is the case. I think it probable that *P. maculosus* is a much more powerful animal than either of the other species. The nose is proportionally narrower, more pointed and shorter in *P. pardicolor*, and the bony palate extends a shorter distance behind the posterior molars. From the opening of the posterior nares to the anterior palatal foramina the distance is 0.93 inch in *P. pardicolor*, 1.27 in *P. maculosus*, the form and position of the foramina being similar in the two.

* Jerdon, Mam. Ind. p. 124, says eight or nine. I count ten pale rings besides the whitish tail tip on two Sikkim specimens, received from Mr. Mandelli. The rings near the base and tip of the tail are narrower than in the middle.

† *Felis gracilis*, Horsfield. Res. in Java. This work is not paged, and the plates are not numbered. The animal is described and figured, and the head, feet and dentition are separately represented on another plate.

‡ Cat. Carn. &c., Mam. Brit. Mus. 1869.

§ In the original 1" 7" but this is, I think, clearly a misprint for 2" 7".

The first specimen of this species (a very beautiful and perfect skin) was obtained by Mr. Davison at B́ankaśun in Southern Tenasserim. The animal was caught in a trap. The second specimen was procured by Mr. Limborg to the East of Moulmain.

Martes flavigula.

Blyth, J. A. S. B., XXVI, p. 316; XLIV, Pt. 2, extra number, p. 29:—Jerdon, Mam. Ind. p. 82.

A skin belonging to the Malayan race, distinguished from the Himalayan form by the crown of the head and nape being brown instead of black, by wanting the white chin, and by the fur being shorter, was obtained at B́ankaśun in Southern Tenasserim by Mr. Davison. The Himalayan form is recorded from Arakan by Mr. Blyth, so that both are found in British Burma.

RODENTIA.

Sciurus rufigenis, Pls. VII, VIII.

W. Blanf. Proc. As. Soc. Bengal, March 1878, p. 93.

S. medius, S. atridorsalem canicemque magnitudine subæquans, sed caudâ corpore cum capite paullo brevior, rostro longo; superne fusco-olivaceus, punctiunculis minutis nigris fulvisque variatus, subtus albus, maculæque albæ post aurem utram signatus, fronte rufescente, genis ferrugineis, mystacibus nigris, caudâ distichâ, superne canâ, pilis nigris albo-terminatis atque semel annulatis indutâ, subtus castaneâ. Long. corporis a rostro ad anum 8, caudæ, pilis ad extremitatem non inclusis 6·5, plantæ sine unguibus 1·8.

Hab. in sylvis densis, ad latera montis Muleyit dicti, in provinciâ Tenasserim Burmanicæ, (Davison, Limborg).

This squirrel is nearly the same size as *S. caniceps* and *S. atrodorsalis*, but the tail is much shorter, its length, without counting the hairs at the end, being always considerably less than that of the head and body; it is distinctly distichous below. Fur soft throughout.

Upper parts dark olive, frizzled, cheeks ferruginous, a small white spot behind the ear, lower parts white, tail hoary, black with white rings and tips above, chesnut below.

The colour of the back and sides resembles that of specimens of *S. caniceps* in which there is no yellow or rufous tinge, being a fine mixture of black and pale yellow, the sides rather paler. The fur on the back, as in several allied species of squirrel, is of two kinds, the finer and shorter hairs being dark leaden colour at the base, pale yellowish grey at the tips, and about a quarter of an inch long in the middle of the back, the longer hairs are coarser, about half an inch long, and black with a pale yellow ring near

the end, the tips being black. As usual the longer hairs are most abundant near the middle of the back, less so on the sides. Forehead rufous mixed with black, the sides of the head are dark ferruginous above, paler below, shading off gradually into the colour of the face and throat. Ears rounded, covered thinly inside and out with short hairs; a little patch of silky white hair behind each ear is concealed by the ear conch when the ears are laid back. Whiskers black. The hairs of the lower parts are dark grey at the base, white at the ends, there is a tinge of rufous on the fore neck and throat in some specimens. Fore limbs yellowish olive outside, like the sides, whitish inside, hind limbs also whitish within, but more rufous outside. Tail clad above with black hairs, having a white ring near, but not at their base, and white tips, so as to produce a very beautiful hoary appearance, lower surface of the tail chesnut, the longer hairs on the sides with black and white tips

The following dimensions in inches were taken by Mr. Davison on fresh specimens :

	♂	♀ ad.	♀ ad.
Length from nose to insertion of tail,.....	7.3	8.2	8.1
„ of tail without hairs at end,	5.7	6.0	6.5
„ of hairs at end of tail,	1.5	2.1	1.3
Total	14.5	16.3	15.9
Length of fore foot (palma) (claws not measured),.....	1.15	1.1	1.1
Length of hind foot from heel without claws,	1.75	1.85	1.8
Height of ear outside,	0.5	0.5	0.55
„ inside from orifice,	0.8	0.8	0.8

The skull (Plate VII) differs considerably from those of *S. lokrioides*, *S. atridorsalis*, *S. caniceps*, *S. phayrei*, *S. blanfordi* and all other allied species with which I have been able to compare it, in the narrow and singularly elongate nasal portion, in which character the present species shews an approach to *Rheithrosciurus* of Gray.

The following are the dimensions of the skull of the present species, compared with those of some of the other Himalayan and Burmese forms.

	<i>S. rufigenis</i> ♂ ad.	<i>S. lokrioides</i> ♀ ad.	<i>S. atridorsalis</i> ♂ ad.	<i>S. caniceps</i> ♂ ad.
Length from occiput to end of nasals,...	2.07	1.85	1.95	2.33
Breadth across zygomatic arches,.....	1.2	1.06	1.18	1.37
„ of brainpan at posterior termination of zygomatic arches,	0.95	0.9	0.93	1.02

* This white mark is represented too large in the plate.

	<i>S. rufigenis.</i>	<i>S. lokrioides.</i>	<i>S. atridor-salis.</i>	<i>S. caniceps.</i>
Breadth across behind post orbital processes,	0.75	0.65	0.7	0.82
„ of frontals between orbits,	0.62	0.63	0.75	0.9
Length of suture between nasal bones,...	0.62	0.53	0.52	0.73
„ of upper row of molars,	0.42	0.36	0.37	0.44
„ of bony palate behind incisors,...	0.9	0.82	0.82	1.
Width of bony palate between posterior molars,	0.27	0.24	0.23	0.3
Length of mandible from angle to symphysis,	1.	0.96	1.05	1.25
„ of row of lower molars,	0.42	0.37	0.38	0.44

Four specimens of this squirrel were obtained by Mr. Davison at the end of January and beginning of February 1877; all were procured in dense forest, at an elevation of above 5000 feet, on the sides of Mooleyit, a lofty mountain east of Moulmain on the range separating the Houngrau from the Thong Yin valley. A single specimen was subsequently procured in the same locality by Mr. Limborg and this was the first to reach me.

None of the other Burmese or Himalayan squirrels resemble the present form, nor am I acquainted with any Malay species with similar colouration. The nearest approach is perhaps made by *S. pernyi*, found at Se-chuen in China.* This species has a yellow spot behind the ear, the lower surface of the tail is ferruginous, and the belly white, but it wants the ferruginous cheeks, it has no white tips to the hairs in the upper surface of the tail, and it is more rufous above, the latter character being, however, of little or no importance.

The Himalayan *Sciurus lokriah* also possesses, I find, the small whitish tuft behind the ear, though less developed than in *S. rufigenis*; the colouring of the lower parts and tail are, however, conspicuously distinct in the two forms. The presence of the white spot in *S. lokriah* affords an excellent character for distinguishing this species from *S. lokrioides*.†

* Milne Edwards, Rev. et Mag. Zool. 1867, p. 230, pl. 19.

† According to Gray, A. M. N. H. Ser. 3, XX, pp. 274, 281, the true *S. lokrioides* of Hodgson is the species with a black tail tip, *S. assamensis* of McClelland and Blyth. The species called *S. lokrioides* by all Indian naturalists is re-named *Macrozue similis* by Gray. As Hodgson's types are in the British Museum and are quoted by Dr. Gray, he may be right, though it is very remarkable that he should be, because the species commonly referred to *S. lokrioides* abounds in Nepal, where Hodgson of course collected it, whilst I doubt if *S. assamensis* be found there. Dr. Anderson has especially examined the British Museum specimens, and will I believe clear up these difficulties.

**Sciurus atridorsalis.**

Gray, Ann. Mag. N. H., 1842, Ser. 1, Vol. X, p. 263; 1867, Ser. 3, Vol. XX, p. 284;—Blyth, J. A. S. B. XXIV, p. 477; XXVIII, p. 276; XLIV, Pt. 2. Extra number, p. 36;—Beavan, P. Z. S. 1866, p. 428.

This is certainly the most variable of the Burmese squirrels. The back varies in colour from dark speckled grey, with scarcely a tinge of fulvous, to grizzled rufous tawny, the head being in the former case the same colour as the back, or slightly rufescent, in the latter distinctly ferruginous, the ears being usually even deeper rufous than the forehead. Occasionally the whole back from the nape to the insertion of the tail, is black; more commonly there is a black patch from between the shoulders to the rump, but frequently the area of black is shorter and narrower, and occasionally, especially in the more rufous specimens, not a trace remains. The whiskers are sometimes entirely white, sometimes all black, occasionally mixed white and black. The tail is normally grey like the sides, with more or less distinct transverse bands, due to the hairs being ringed greyish white and black, but in some specimens all the hairs are black except at their extreme tip, and in others, they are entirely pale rufous, save at the extreme base, and even this amount of dark colouration disappears towards the tip of the tail. The lower surface, including the breast, abdomen and inside of the limbs is normally rich bay, but sometimes chesnut, pale ferruginous or even pale rufescent, in the dark rufous form the red sometimes extends to the throat, in other cases the lower neck is grey, or the whole central portion is pale rufous, and only the lateral parts bay, especially on the breast. I have two specimens also in which the middle of the breast and abdomen is grizzled like the sides and throat, the lateral portions of the lower parts alone being bay. This shews a complete passage into *S. gordonii**: it is true that in the latter, so far as I know, there is no black on the back, but as this peculiarity is not constant is true *S. atridorsalis*, the distinction is evidently insufficient. The paler under parts may possibly be due to immaturity; with this exception however I cannot find that the variations I have mentioned are due to either sex or age. All specimens from Myawadi appear to have black whiskers, and all from Moulmain white, but from Kaukaryit, on the Hounghdarau river, south of Myawadi, I have both forms. I am indebted to Mr. Hume for a superb series of this species and of *S. caniceps*, and I have also a considerable number of both from the collections made by Mr. Limborg. These two are in fact the commonest squirrels of Tenasserim.

The following are measurements by Mr. Davison:

* Anderson, P. Z. S., 1871, p. 140.

	1	2 ♂ juv.	3 ♂	4 ♀ ad.	5 ♂ ad.	6 ♂ ad.
Length from nose to anus,.....	8·	8	8·5	8·65	8·9	7·62
„ of tail from anus,	7·5	7·9	7·4	7·7	7·75	8·3
„ of hairs at end of tail,.....	2·5	2·5	2·7	2·4	2·5	2·
Total	18·0	18·4	18·6	18·75	18·15	17·92
Length of fore foot (without claws),	0·82	1·15	1·18	1·2	1·2	1·19
„ hind foot and tarsus (do.),	1·55	1·85	1·7	1·8	1·9	1·8
Height of ear outside,.....		0·5	0·55	0·4	0·5	0·55
„ inside from orifice,	0·55	0·65	0·71	0·9	0·92	0·68

Some measurements of spirit specimens differ but little from the above.

I have only seen *S. atridorsalis* from the northern portion of the Tenasserim provinces, the species has not yet, so far as I am aware, been recorded from Mergui or Tavoy, nor is it known to occur west of the Salween river. It abounds around Moulmain and Amherst, and in the valleys of the Houngdarau and Attaran rivers.*

S. phayrei.

Blyth, J. A. S. B., XXIV, 1855, p. 476; XLIV, Pt. 2, Extra number, p. 36;—Peters, P. Z. S. 1866, p. 429,—Gray, Ann. Mag. Nat. Hist. Ser. 3, XX, p. 277.

S. hyperythrus, Blyth, J. A. S. B., XXIV, p. 474.

This species, as noticed by Blyth, is only known to occur west of the Salween. It is not, so far as I am aware, found west of the Sitoung; in the Irawadi valley in Pegu, it appears to be replaced by *S. pygerythrus*, whilst further north, around Ava, it is represented by the closely allied *S. blanfordi*, into which it doubtless passes. *S. phayrei*, Mr. Davison tells me, is found north as far as Pah-Khyoung at the southern extremity of Kareni; (the country of the Red Karens).

The following are dimensions of a female from Thatone:

	in.
Length from nose to anus,.....	9·6
„ of tail from anus,	8·8
„ of hairs at end of tail,	2·3
Total	20·7
Length of fore foot (without claws),.....	1·2
„ of hind foot and tarsus (do.),	1·8
„ of ear outside,	0·5
„ „ inside from orifice,	0·7

* Error is proverbially immortal, and consequently, attention cannot be too frequently called to the circumstance that the localities assigned to this species and to many other Asiatic squirrels in Dr. Gray's lists are incorrect.

**S. caniceps.**

Gray, Ann. Mag. Nat. Hist. 1842, Ser. 1, Vol. X, p. 263; Ser. 3, XX, p. 280;
Blyth, J. A. S. B., 1876, XLIV, Pt. 2, Extra number, p. 36.

S. chrysonotus, Blyth, J. A. S. B., XVI, p. 873; XXIV, p. 474.

S. concolor, Blyth, J. A. S. B., XXIV, p. 474.

Although there is nothing like the variation in colouring in this species that there is in *S. atridorsalis*, still a wide difference is found between different specimens, especially in the colouration of the upper parts, as Blyth and Gray have noticed; some having the back pale ferruginous, whilst others have the whole upper surface dull olivaceous grey, minutely punctulated with scarcely a trace of rufous. The most rufous specimens I have seen are from the Houngdarau valley, east of Moulmain, in these the crown of the head, the back from the nape to the commencement of the tail and the sides are pale rusty red with scarcely a trace of punctulation. Moulmain specimens, as a rule, are punctulated and merely washed with rufous, especially on the anterior part of the back, or the rufous tinge is very faint, and sometimes wanting. Blyth has noticed* that the least rufous specimen he had seen came from Mergui. Southern Tenasserim specimens, judging from one skin collected by Mr. Davison in Tavoy, and several from Bánkasún, want the ferruginous tinge entirely. To the Bánkasún specimens I will refer further presently.

There is also some variation in the colouration of the abdomen. Some specimens are almost white below, others more or less cinerous and more or less punctulated. In some the colour of the lower parts is olivaceous grey, scarcely paler than the sides. In very many specimens there is a dark mesial line more or less developed, but it is not constant. These differences of colouration in the under surface are apparently quite independent of the degree to which the upper parts are washed with rufous, and none of the differences, so far as I can judge, are due to age or sex.

The specimens from Bánkasún in the extreme south of the Tenasserim provinces are decidedly darker, both above and below, than any I have examined from farther north, much darker even than the Tavoy specimen. The Bánkasún skins are almost olive green above, distinctly punctulated, and scarcely paler but rather greyer below. In two specimens out of three there is a darker mesial line beneath. The only difference between these skins and *S. concolor* of Blyth from Malacca, of which species I have examined the type in the Indian Museum, consists in the latter having a slight rufous wash on the upper surface. I have no doubt that the Bánkasún squirrel passes into the Malaccan *S. concolor*. These dark olivaceous forms may perhaps be sufficiently distinct to constitute a local

* J. A. S. B., 1855, XXIV, p. 475.

race, for which Blyth's name may be retained, but they are not, I think, really separable from *S. caniceps*.

The following dimensions in the flesh of two adult females, are taken from Mr. Davison's tickets; both specimens are from Kaukaryit in the Hougdarau valley. I also add (3 and 4) the measurements of two spirit specimens from Mr. Limborg's collection.

	1 ♀	2 ♀	3 ♂	4 ♀,
Length from nose to anus,	8·2	8·7	9·25	8·75
„ of tail from anus,	9·2	9·8	7·75	9·25
„ of hairs at end of tail,	2·5	2·3	3	3·25
Total	19·9	20·8	20·	21·25
Length of fore foot (without claws),	1·2	1·2	1·32	1·22
„ of hind foot and tarsus (do.),	1·8	1·85	2·	2·05
Height of ear outside,	0·4	0·52	0·45	0·45
„ inside from orifice,	0·8	0·9	0·83	0·8

S. caniceps ranges throughout the Tenasserim provinces from Moulmain to the banks of the Pakchoung. I have also one specimen labelled from Thatone, which is to the west of the Salween, but the skin so precisely resembles the peculiarly dark olive specimens from Bánkasún that I am inclined to suspect the label must have been changed by accident.

S. mouhoti.

Gray, P. Z. S., 1861, p. 137.

S. berdmorei, Gray, Ann. Mag. Nat. Hist. Ser. 3, XX, p. 279. (? an *S. berdmorei* *cerus* Blyth.)

Several skins were procured by Mr. Davison, and a specimen in spirit was collected by Mr. Limborg, of a species of striped squirrel differing somewhat from the Museum specimens of *S. berdmorei*, but agreeing very well with Gray's description of *S. mouhoti* from Camboja.* The museum specimens of *S. berdmorei*, said by Blyth† to have been collected by himself in Martaban‡, have three broad black stripes along the back, whereas in the specimens before me there are no black stripes and no distinct darker

* Especially with the second description quoted above from the 'Annals and Magazine of Natural History.' In the original description the interspace between the pale lateral lines was said to be black, in the second account blackish, which accords better with Mr. Davison's specimens. The remark appended to the original description of *S. Mouhoti*, that it differs from most squirrels of the same size by having the three streaks on the upper part of the back, I understand to refer to the lateral bands, a dark one between two pale stripes, on the upper part of the side, not on the lower as in *S. vittatus* and its allies.

† Cat. Mam. Mus. As. Soc. p. 106.

‡ J. A. S. B., 1862, XXXI, p. 333.

band in the middle of the back, although there is a slight indication of darkening in one specimen. In the original description of *S. berdmorei*,* it was said to have an obscure pale central dorsal streak, flanked by a blackish band, but in a subsequent description† of an example sent from Moulmain the three black bands of the back were especially noticed. Subsequently *S. mouhoti* was described by Gray and then identified by the describer with *S. berdmorei*, an identification adopted by Blyth.‡ It is possible that the two forms pass into each other, but they look very different, and for the present I prefer retaining Gray's name for the variety before me, of which the following is a description.

The upper surface is yellowish brown, puncticulated, the hairs being black with two buff rings. The fine woolly under-fur is dark slate-coloured at the base with buff tips. On each side of the back there are two longitudinal pale lines extending from the shoulder to the thigh, the upper narrow and well defined, the lower broader and less marked. Between the two and above the upper pale line, the fur is darker in some specimens, but apparently this is not constant. The sides below the lower pale lateral bands are greyish brown puncticulated. The lower parts throughout are white, sometimes tinged with buff. The tail hairs are light brown at the base, then black, then brown again, then black to near the tips, which are whitish. Whiskers black. The ears are rounded with very short hairs outside.

The bare planta on the hind feet extends further towards the heel than in the more typically arboreal squirrels, *S. caniceps*, *S. atridorsalis* and *S. phayrei*, in which the bare portion ends about $\frac{1}{2}$ to $\frac{1}{3}$ of an inch from the proximal extremity of the tarsus, whereas in *S. mouhoti* it extends to the joint. The claws too in *S. mouhoti* are rather less curved, and the pads on the feet appear more raised.

The following are measurements in inches taken by Mr. Davison, before skinning, on two females, the first from Kaukaryit, the second from Myawadi, both east of Moulmain, and of the male preserved by Mr. Limborg in spirit.

	1♀	2♀	3♂
Length from nose to anus,	7·3	6·8	6·4
„ of tail from anus,.....	5·8	5·6	5·4
„ of hairs at end of tail,.....	2·	2·	—
Total	15·1	14·4	—

* J. A. S. B., 1849, XVIII, Pt. 1, p. 603.

† J. A. S. B., 1859, XXVIII, p. 418.

‡ J. A. S. B., 1875, XLIV, Pt. 2, Extra number, p. 37.

	1 ♀	2 ♀	3 ♂
Length of fore foot (without claws),.....	0·88	0·85	0·85
„ hind foot and tarsus (do.),	1·53	1·5	1·65
Height of ear outside,.....	0·4	0·5	0·35
„ inside from orifice,	0·8	0·8	0·65

Blyth in his list of the Mammals of Burma, suggests that *S. berdmorei* should perhaps more properly range as a species of *Tamias*. In the specimen of *S. mouhoti* in spirit, obtained by Mr. Limborg, I cannot detect any cheek pouches. Unfortunately the skull of this specimen is too much injured to be extracted for measurement.

The only specimens of this squirrel hitherto obtained are from the country east of Moulmain. Mr. Davison informs me that he has never seen either this or *S. berdmorei* in Southern Tenasserim. The latter is, however, reported with some doubt by Blyth from Mergui.

S. barbei.

Blyth, J. A. S. B., XVI, p. 875, Pl. XXXVI, fig. 3; XVIII, p. 603; XLIV, Pt. 2, Extra number, p. 38.

The following are the dimensions of three fresh specimens recorded by Mr. Davison: 1 and 3 from Kaukaryit on the Houngdarau river, 2 from Myawadi.

	1 ♂ ad.	2 ♂ ad.	3 ♀
Length from nose to anus,.....	4·65	4·6	4·7
„ of tail from anus,	5·	4·9	5·
„ of hairs at end of tail,	0·85	1·5	1·
Total	10·5	11·0	10·7
Length of fore foot (without claws),.....	0·75	0·7	0·7
„ hind foot and tarsus (do.),	1·	1·12	1·15
Height of ear outside,.....	0·4	0·45	0·45
„ inside from orifice,.....	0·58	0·6	0·6

This species appears to be found throughout Tenasserim, extending south to Malacca. Specimens from Southern Tenasserim and from Malacca have much darker dorsal bands and shorter ear tufts than those from the neighbourhood of Moulmain. Judging from the specimens before me too, the southern form appears smaller, with a comparatively shorter tail, but I have no fresh measurements. The original types came from Yé, about half way between Moulmain and Tavoy, and probably belonged to the Northern variety.

Pteromys cineraceus.

Blyth, J. A. S. B., XVI, p. 865 ; XXVIII, p. 276 ; XLIV, Pt. 2, Extra number, p. 35.

A fine female skin from Wimpong, 15 miles from Thatone, (west of the Salween) has the tip very little darker than the remainder of the tail, and is easily distinguished from *P. oral* of Southern India by its greyer colour, and by the lower parts being white. The following are the dimensions noted by Mr. Davison on the fresh specimen.

	in.
Length from nose to anus,	18·5
„ of tail from anus,.....	22·5
„ of hairs at end of tail,.....	3·
	—
Total	44·0
Length of fore foot (without claws),	2·4
„ of hind foot and tarsus (do.,)	3·
Height of ear outside,	1·5
„ inside from orifice,	2·

Rhizomys castaneus.

Blyth, J. A. S. B., XII, p. 1007 ; XLIV, Pt. 2, Extra number, p. 41.

A specimen from Thatone in Martaban, west of the Salween river, and another from, I believe, the same neighbourhood, differ from Arakan and Pegu specimens by having a white spot in the middle of the forehead, as in some other species of the genus. As there appears no other distinction, and as the spot is evidently variable, being far more distinct in one specimen before me than in another, I do not think this form is more than a variety.

Mus robustulus.

Blyth, J. A. S. B., XXVIII, p. 294 ; XLIV, Pt. 2, Extra number, p. 39.

Specimens in spirit from near Maulmain collected by Mr. Limborg do not appear to me distinct from the common tree rat of lower Bengal, *M. rufescens* of Blyth and Jerdon, but not, I think, of Gray, as in the original description by the latter the tail is said to be shorter than the body, whereas in both the Bengal and Burmese rats the tail exceeds the head and body in length. I can see no difference in the skulls of the Bengal and Tenasserim rats.



UNGULATA.

*Tragulus napu.**Moschus napu*, Raffles, Linn. Trans. XIII, p. 262.*Tragulus napu*, A. Milne-Edwards, Ann. Sc. Nat. Ser. 5, II, 1864, pp. 106, 158, Pl. II, fig. 2;—Blyth, J. A. S. B., XLIV, 1875, Pt. 2, Extra number, p. 44; P. Z. S., 1864, p. 483.*T. fuscatus*, Blyth, J. A. S. B., XXVII, 1858, p. 278.*T. javanicus*, Blyth, Cat. Mam. Mus. As. Soc., p. 155, nec Pallas.

As was suggested by Blyth in his remarks on *Tragulus kanchil*, the larger form of chevrotain is also found in Southern Tenasserim, Mr. Davison having procured an adult and a young animal from Bánkasún. Owing to the extreme confusion which formerly prevailed as to the synonymy of the *Traguli*, the nomenclature and distribution of the different species cannot be said yet to be rightly determined in all cases, but it is clear that two distinct forms are found in the Tenasserim provinces and these forms appear to be the *T. kanchil* and *T. napu* of A. Milne-Edwards' monograph of the *Tragulidæ* in the 'Annales des Sciences Naturelles', as has already been pointed out by Mr. Blyth.

The most striking differences between the two species are,—first, size; *T. napu* being probably thrice the weight of *T. kanchil*;—second, the much stouter limbs of the former; the length of the tarsus and hind foot in two specimens before me of *T. napu* and *T. kanchil* respectively being 5·85 and 4·8, whilst the circumference of each tarsus in the middle is 1·3 and 0·85;—and, third, colouration, especially below. There is but little difference above; both are brown, becoming paler and greyer on the sides, but the dark line from the nape down the back of the neck is much more distinct in *T. kanchil*. The colouration of the throat and belly, however, is very different; in *T. napu* there are five white stripes on the throat, one longitudinal in the middle, and two oblique stripes on each side, the upper lateral band being much shorter than the lower. In the adult skin from Tenasserim all these bands unite in front, but not in the young specimen, in which the median stripe is separated from the others, as described by Milne-Edwards. The interspaces between the white bands are dark brown, darker than the sides of the neck, but this appears sometimes to be the case in *T. kanchil* also. The abdomen in adult *T. napu* is mostly white, the breast and the space between the thighs purer white than the rest; in the young all the middle portion of the abdomen between the broad white breast and the narrower white groin is smokey brown; in both there is a rudimentary dark median band, not nearly so distinct as in *T. kanchil*.

In *T. kanchil* there are but three white stripes on the throat, the median line being sometimes entirely distinct from the two broad and long



oblique lateral stripes, sometimes coalescing with them in front; the abdomen is pale rufous and white in patches, the centre of the anterior portion and the sides of the posterior portion being white, and the remainder rufous, but the proportion of the two colours varies; there is, however, a well marked dark median line along the anterior half beginning from the dark transverse band on the breast.

In both species the rump is rufous, and the tail brown above, white below and at the tip. All the differences noticed, except the number of white stripes on the throat, have already been pointed out by Blyth.

XI.—*List of Hymenoptera obtained by MR. OSSIAN LIMBORG east of Maulmain, Tenasserim Provinces, during the months of December 1876, January, March and April 1877, with descriptions of new species:—by FREDERICK SMITH, Biological Department, British Museum. (Communicated by J. WOOD-MASON.)*

(Received 30th August, 1878.)

Scoliadæ.

1. ELIS LINDENI, St. Fargeau, Hym. III, 500.
2. LIACOS ANALIS, Fabr.

Pompilidæ.

3. POMPILUS PEREGRINUS, Smith.
4. POMPILUS VITIOSUS, n. sp.

Male. Ferruginous: the thorax with black markings, and the abdomen fusco-ferruginous towards the apex. The antennæ fuscous above; the eyes and tips of the mandibles black; the front, before the antennæ, pale reddish yellow. The mesothorax with a black longitudinal stripe on each side; the thorax at the sides and beneath paler than the disk, and with a golden lustre; the pectus black; wings fusco-hyaline. The extreme base of the abdomen black; the first, second and third segments with their apical margins fusco-ferruginous, the following segments entirely so.

Length $6\frac{1}{2}$ lines.

Sphegidæ.

5. AMMOPHILA NIGRIPES, Smith, Cat. Hym. Ins., Pt. IV, p. 215.
6. CHLORION LOBATUM, Fabr., Ent. Syst., II, p. 206.

**Bembicidæ.**7. *BEMBEX FOSSORIUS*, n. sp.

Female. Black, with lacteous fasciæ and markings above, the legs faintly yellow. The clypeus, labrum, mandibles, the scape in front, a narrow line at the inner orbits of the eyes, and a broad one behind, not extending to their summit, white, faintly yellow behind the eyes; the tips of the mandibles, and a transverse spot at the base of the clypeus, black; the vertex with a downy white pubescence. Thorax smooth and shining above, and very finely punctured; the margin of the prothorax, a line over the tegulæ, uniting with a curved one on the hinder margin of the scutellum, a narrow transverse one on the post-scutellum, a curved transverse one on the metathorax, and its posterior lateral angles, lacteous; the sides of the thorax and the legs more or less faintly yellowish; the coxæ and femora with black markings; the claw-joint of the tarsi fuscous; wings hyaline, the nervures fusco-ferruginous. The segments of the abdomen with broad lacteous fasciæ a little before the apical margins of the segments; the fasciæ with their anterior margins emarginate laterally; black beneath, with the lateral posterior angles lacteous.

Length $8\frac{1}{2}$ lines.

Eumenidæ.8. *EUMENES ARCUATUS*, Fabr., Ent. Syst., II, p. 276.**Vespidæ.**9. *POLYBIA SUMATRENSIS*, Sauss.10. *P. ORIENTALIS*, Sauss., Mon. Guépes Soc., p. 208.**Poneridæ.**11. *DIACAMMA SCALPATRUM*, Smith, Cat. Hym. Ins., Form., p. 84.**Apidæ.**12. *MEGACHILE DIMIDIATA*, Smith, Cat. Hym. Ins., Apidæ, Pt. I, p. 174.13. *XYLOCOPA LATIPES*, Drury, Illust. Exot. Ins., II, p. 98.14. *X. ÆSTUANS*, Linn., Syst. Nat., I, p. 961.15. *X. COLLARIS*, St. Farg., Hym. II, p. 189.16. *X. AMETHYSTINA*, Latr., Ins. III, p. 375.17. *BOMBUS EXIMIUS*, Smith, Cat. Hym. Ins., Apidæ, II, p. 403.18. *BOMBUS MONTIVAGUS*, n. sp. ♀.

Black: head elongate, the clypeus shining and finely punctured; the pubescence black. Thorax with rufo-fulvous pubescence above, and with black on the disk; the posterior tibiæ and tarsi obscurely ferruginous, palest beneath; the tarsi with ferruginous pubescence within; wings dark brown with a purple and violet iridescence in certain lights; the tegulæ



obscurely rufo-piceous. Abdomen: the basal segment with bright yellow pubescence, on the second and third it is black, and on the following segments it is bright ferruginous; beneath, obscurely ferruginous, and the segments fringed with rufo-fulvous pubescence.

Length $9\frac{1}{2}$ lines.

Hab. Moolaiyet. Alt. 3-6000 ft.

19. *APIS INDICA*, Fabr., Ent. Syst., Supp. p. 274.

20. *APIS FLOREA*, Fabr., Ent. Syst., II, p. 341.

21. *TRIGONA TERMINATA*, n. sp.

Worker. Black: head and thorax semiopaque, abdomen smooth and shining. The anterior margin of the clypeus, the labrum, mandibles, and basal half of the scape in front, pale ferruginous; the apical joint of the flagellum pale. The margins of the mesothorax pale ferruginous; the scutellum fringed with short fulvous pubescence, the tarsi, except the basal joints, ferruginous; wings hyaline and iridescent, the nervures and tegulæ testaceous. The base and apex of the abdomen rufo-testaceous, the former with two black spots; beneath pale rufo-testaceous.

Length $2\frac{1}{2}$ lines.

XII.—*Preliminary diagnoses of new Coleopterous Insects belonging to the families Dytiscidæ, Staphylinidæ, and Scarabæidæ obtained by the late DR. F. STOLICZKA during the 2nd mission to Yarkand under SIR DOUGLAS FORSYTH.—By D. SHARP.*

DYTISCIDÆ.

1. *Agabus dichrous.*

A. oblongo-ovalis, nitidus, subtus niger, supra testaceus, vertice nigro, rufo-bimaculato, antennis pedibusque testaceis, femoribus in medio late nigris; scutello fusco; elytris apicem versus vix fusco-nebulosis. Long. 8 mm., lat. 4 mm.

HAB. A single male individual found on the road across the Pámir from Sarikol to Panjah.

2. *Ilybius cinctus.*

I. ovalis, angustulus, parum convexus, subtus ferrugineus; supra fusco-æneus, prothoracis elytrorumque lateribus late testaceis; subnitidus, subtilissime reticulatus. Long. $8\frac{1}{2}$ mm., lat. vix $4\frac{1}{2}$ mm.

HAB. Yangihissár.



STAPHYLINIDÆ.

1. *Tachinus stoliczkæ*.

T. parvulus, sub-depressus, niger, elytris castaneis vel piceo-castaneis, antennis pedibusque sordide testaceis; prothorace fere impunctato, elytris parce punctatis, obsolete strigosulis, abdomine sat crebre sub-obsolete punctato. Long. 6 mm., lat. 1½ mm.

HAB. On the road across the Pámir from Sarikol to Panjah.

2. *Philonthus stoliczkæ*.

P. rubido, Er. similis et affinis: angustulus, sub-parallelus, niger, elytris rufis, antennis fuscis, basi cum pedibus testaceis, abdominis segmentis ferrugineo-marginatis; thorace angustulo, subparallelo, serie discoidali punctarum 5, et punctis lateralibus sat numerosis, elytris rufis basi summo paullo obscuriore, crebre, fere fortiter punctatis; abdomine dense, æqualiter subtiliterque punctato, opaco. Long. 5 mm.

HAB. Yárkand.

3. *Philonthus pamirensis*.

Ex. affinitate Staph. tenuis, Fabr. Angustulus, haud parallelus, niger, elytris rufis, antennis pedibusque posterioribus fuscis, illarum basi pedibusque anterioribus testaceis; abdomine subtiliter punctato. Long. 6 mm.

HAB. On the road across the Pámir from Sarikol to Panjah.

SCARABÆIDÆ.

1. *Onthophagus concolor*.

O. niger, fere nudus, supra opacus, subtus sat nitidus; prothorace peropaco, parcius subtiliter punctato, lateribus ad angulos anteriores evidenter sinuatis; elytris subtiliter striatis, interstitiis parcius et subtiliter punctatis, punctis haud perspicue setigeris. Long. 7—9 mm.

Masc. Capite vertice medio breviter tuberculato, prothorace fere mutico.

Fem. Capite medio lineâ curvatâ sat elevatâ, vertice medio laminâ elevatâ (ad apicem plus minusve emarginatâ) brevissimâ

HAB. Sind valley, Káshmir; and Murree, Panjáb hills.

2. *Aphodius æger*.

A. Scarabæi granarii, Lin. similis; oblongus, leviter convexus, nitidus, niger, elytris piceis vel fere nigris, pedibus rufis, clypeo medio emarginato, fronte fere muticâ; prothorace subtiliter punctato, versus latera punctis



majoribus crebribus, margine basali integro, angulis posterioribus sinuatis; clytris vix subtiliter striatis, striis indistincte crenatis, 7° et 8° ante apicem conjunctis, humeris longius ciliatis. Long. 5—5½ mm., lat. 2½ mm.

HAB. Two small specimens were found at Yangihissár; of some others the exact locality is not recorded.

3. *Aphodius kashmirensis.*

A. niger, nitidus, sat convexus, pedibus rufo-piceis, antennis rufis, clavá fuscá; clypeo antérieus emarginato, et utrinque subacute prominulo; prothorace punctis magnis profundis sat numerosis, aliisque minutis, margine basali distincto, sulculo ante eum crenulato, clytris fortiter crenato-striatis, interstitiis subtilissime sparsim punctatis.

Long. 6—6½ mm., lat. 3½ mm.

HAB. Drás, Kargil and Leh, in Ladák.

4. *Aphodius tenuimanus.*

A. Aphodii melanosticti, Er. persimilis; oblongus, subconvexus, nitidus, infuscato-testaceus, capite thoraceque nigris, hoc lateribus testaceis; clytris luteis, maculis dorsalibus 4 vel 5, strigáque sublaterali nigris, pedibus metasternoque medio testaceis; fronte medio vix tuberculato; tibiis anterioribus tenuibus, intus conspicue ciliatis. Long. 5—6 mm.

The exact locality where Dr. Stoliczka procured the specimens is unknown.

5. *Geotrupes kashmirensis.*

G. Geotrupis stercorarii (Haroldi) persimilis, sed clytris longioribus; oblongo-ovalis, supra viridescens-niger, nitidus, subtus purpureus, fulvo-pubescent; antennis piceo-rufis; mandibulis extus rotundatis, ad apicem leviter unisinuatis; clytris striis 14, minus distincte punctatis; abdomine etiam in medio punctato, sed illo minus pubescente; tibiarum posticarum carinâ tertiâ (ab apice) omnino carente. Long. 24 mm., lat. 13 mm.

HAB. Drás, Kargil or Leh, two individuals.

6. *Hoplia concolor.*

H. oblonga, sat elongata, ferruginea, squamulis pallide griseis, magnis, fere æqualiter vestita; tarsorum posticorum unguiculo mutico. Long. 8 mm., lat. 4½ mm.

HAB. Kugiár.

7. *Serica læticula*.

S. obovata, convexa, nitidula, tantum abdomine opaco, brunneo-ferruginea; prothorace fortiter punctato, elytris seriatim punctatis, seriebus leviter depressis, interstitiis planis, tantum juxta series punctatis; antennis 10-articulatis, flabelli articulo primo apice emarginato. Long. 8½ mm., lat. 4 mm.

Locality not recorded.

8. *Lachnosterna stridulans*.*

L. testacea, capite, thorace scutelloque fere ferrugineis, supra opaca, opalescens, subtus abdomine inflato nitido, pectore minus dense villosa; capite brevi, fortiter punctato; prothorace sparsim punctato fortiter transverso, margine laterali integro, sinuato, angulis posterioribus obtusis; elytris sat crebre parum profunde punctatis. Long. 15½ mm., lat. 8 mm..

HAB. Murree, a single individual.

9. *Lachnosterna stoliczkæ*.

L. oblonga, picea, nitida, pectore prosternoque griseo-villosa; capite haud parvo, clypeo fortiter reflexo-marginato, anterius vix emarginato; prothorace lateribus rotundatis, anterius quam posterius magis angustato, crebrius punctato, angulis posterioribus obtusis, margine laterali serrato; elytris crebrius fortiter punctatis, areis longitudinalibus parcius punctatis, haud argute elevatis. Long. 15—16 mm., lat. 8 mm.

HAB. Murree.

* I am acquainted with only one other species closely allied to this, it is as yet undescribed and is labelled in my collection "*Ancylonycha pulvinosa*, Reiche, *India bor*;" it has the same appearance as *L. stridulans*, and has, like it, the epipleural line finely crenulate, but it differs considerably in the structure of the antennæ and of the claws; in *Lachnosterna stridulans*, the flabellum of the antenna is rather long, and composed of five joints, the first is, however, very short, not half the length of the second, which itself is a good deal shorter than the three following ones; the claws are divided into two rather divergent portions of equal length. In the undescribed Reicheian species the flabellum is short and composed only of three joints, and the claws of the feet are strongly dentate in the middle.

I add a short diagnosis of this insect.

LACHNOSTERNA PULVINOSE, n. sp. *Ferruginea, elytris dilutioribus, supra opaca, opalescens, subtus abdomine inflato, medio nitido, pectore parcius villosa; capite brevi dense rugoso-punctato; prothorace sparsim punctato, punctis in margine anteriori magnis, fortiter transverso, lateribus valde sinuatis, in medio perditatis, angulis posterioribus valde obtusis, margine laterali subcrenulato; elytris sat crebre subtiliter punctatis. Long. 16 mm.*

10. *Rhizotrogus bilobus*.

R. antennis 10-articulatis; oblongus, colore variabilis, ferrugineus vel piceus, subopacus, prothorace in medio sæpius nitido, ad latera albido-pruinoso; clypeo in medio profunde emarginato; prothoracis lateribus antèrius crenulatis; elytris indistincte et inequaliter punctatis, lateribus dense ciliatis; pygidio ventreeque pruinosis; pectore prosternoque dense villosis.

Long. $17\frac{1}{2}$ —20 mm., lat. 9—10 mm.

HAB. Yangihissár and Kugiár, Eastern Turkestan.

11. *Anomala stoliczkæ*.

(Genus *Callistethus*, Blanch.) *A. ovata, minus convexa, lætissime viridis, nitidissima; elytris subopacis, antennis nigris; capite thoraceque lævigatis; elytris seriebus duplicatis punctorum tribus, et inter eas sat crebre punctatis.* Long. $12\frac{1}{2}$ mm., lat. $6\frac{1}{2}$ mm.

HAB. A single individual was found at Murree.

12. *Adoretus nudiusculus*.

A. testaceus, clypeo ferrugineo, fronte fusca, nitidula, parcius brevissimeque setosus; prothorace fortiter punctato, lateribus subcrenulatis, angulis posterioribus omnino rotundatis; elytris obsolete costatis, fortiter punctatis.

Long. $9\frac{1}{2}$ mm., lat. $5\frac{1}{4}$ mm.

HAB. Jhelum valley, a single individual.

13. *Adoretus simplex*.

A. angustulus, parallelus, sat elongatus, densius albido-setosus, subopacus, subtus parcius setosus, nitidus; clypeo rotundato, in medio alte reflexo; prothorace basi æqualiter et tenuiter marginato, angulis posterioribus rotundatis; elytris obsolete costatis, crebrius punctatis.

Long. 10 mm., lat. $4\frac{1}{2}$ mm.

HAB. Jhelum valley.

14. *Pentodon truncatus*.

P. nigro-piceus, nitidus, capite antèrius truncato, angulis inter se distantibus, tuberculo longitudinali acuto, fronte in medio tuberculis duobus minutis; prothorace fortiter punctato, basi ad angulos posteriores tenuiter marginato. Elytris sat crebre haud profunde punctatis, seriebus duplicatis haud distinctis. Long. 19—20 mm., lat. 12 mm.

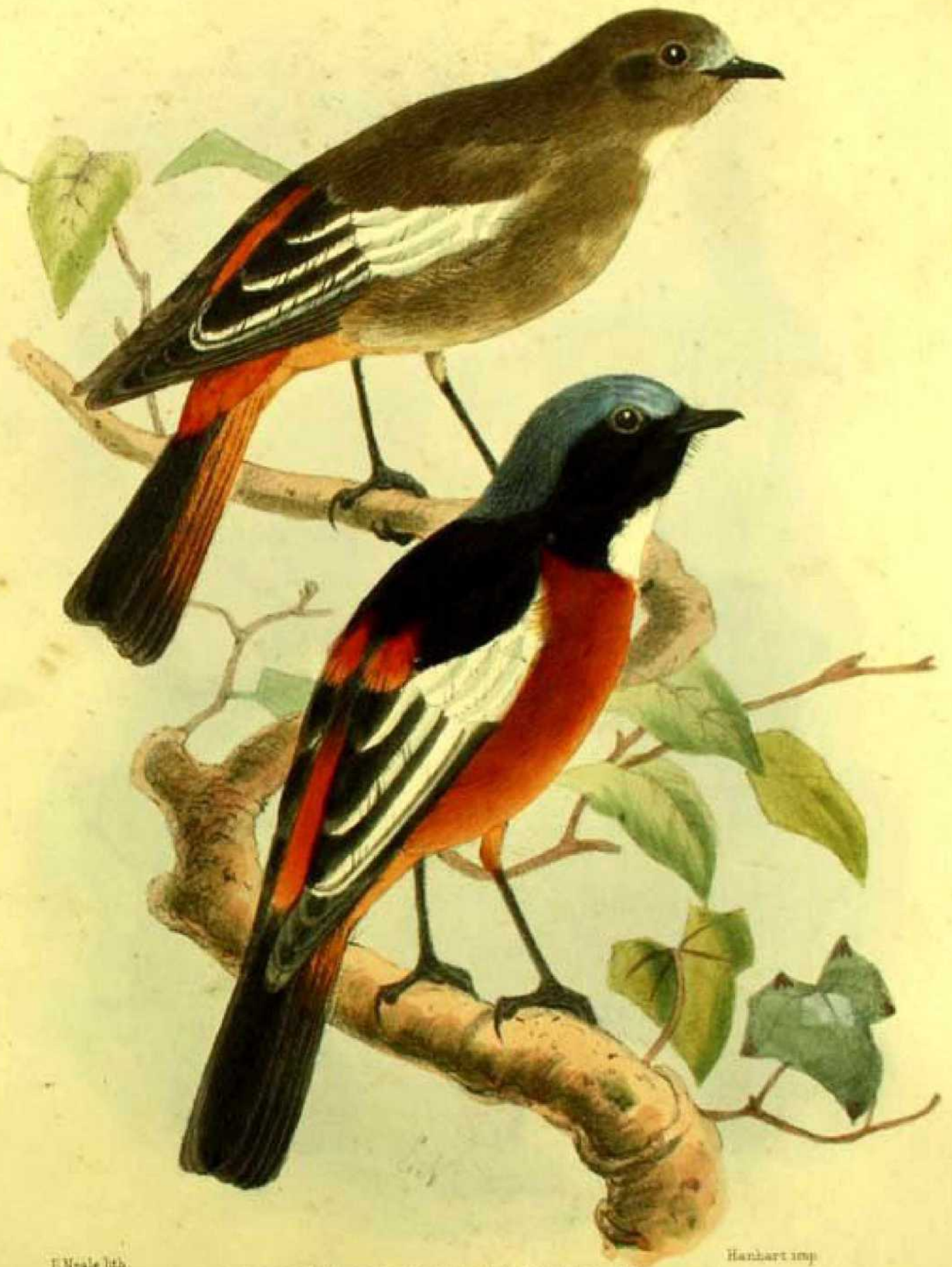
HAB. Kugiár. Two individuals, which are no doubt both males.

15. *Pentodon pumilus.*

P. nigro-piceus, nitidus, capite antèrius truncato, angulis inter se distantibus, tuberculo longitudinali acuto, fronte in medio tuberculis duobus minutis; prothorace fortiter punctato, basi ad angulos posteriores tenuiter marginato; elytris fere dense, subrugulose punctatis, serièbus duplicatis haud distinctis.

Long. $14\frac{1}{2}$ — $15\frac{1}{2}$ mm., lat. 9—10.

HAB. Kugiár.



E. Meale lith.

RUTICILLA SCHISTICEPS, 69.

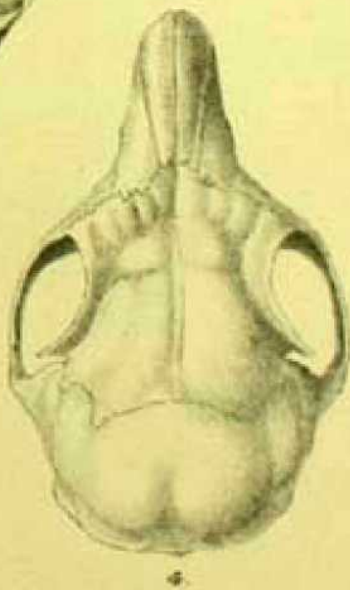
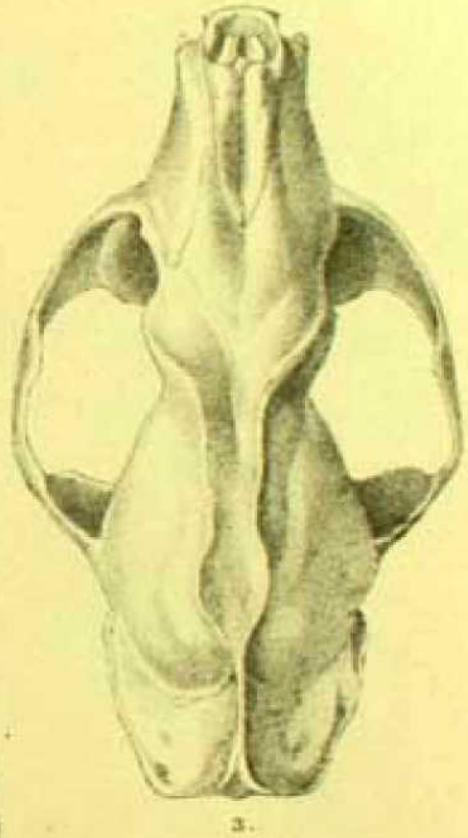
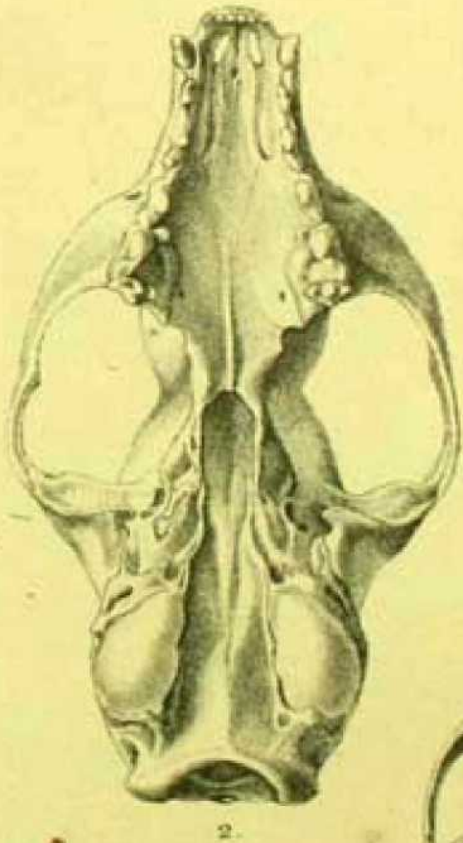
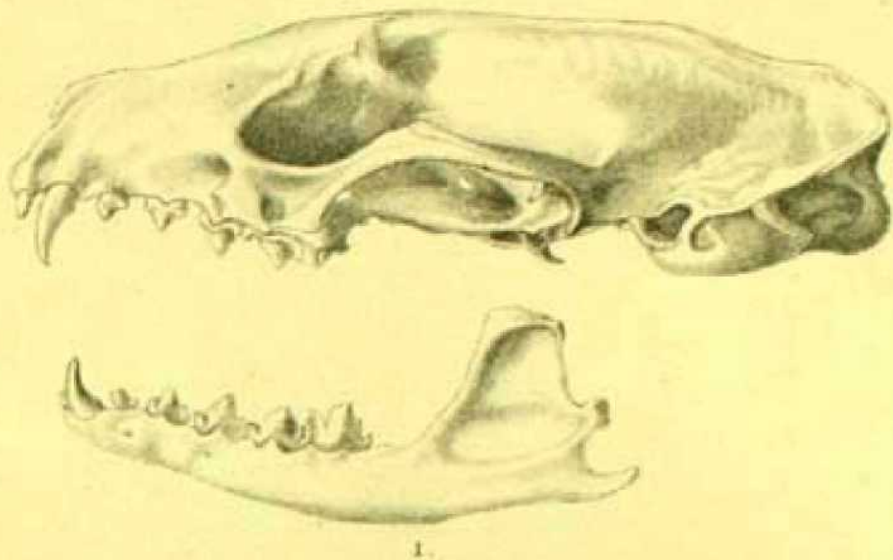
Hartart imp.



J. Smith del.

Reynolds sculp.

PRIONODON MACULOSUS.





J. Smut lith

Hannhart imp.

SCIURUS RUFIGENIS

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Part II.—PHYSICAL SCIENCE.

No. IV.—1878.

XIII.—*Description of a new Lepidopterous Insect belonging to the genus*
Thaumantis.—By J. WOOD-MASON.

(With Plate XII.)

Besides the fine and beautiful insect described below, there are represented in the Zoological collections formed by Mr. Ossian Limborg and staff in Upper Tenasserim during the months of December, 1876 and January, February, March, and April 1877, 225 other species of *Lepidoptera*, partly butterflies, 50 to 60 of which are considered to be undescribed, and several of which are referred to new genera, by Mr. F. Moore, who has worked out the whole collection and written a paper upon it which will shortly be published and illustrated by three or four coloured plates in the Proceedings of the Zoological Society of London.

LEPIDOPTERA.

Fam. MORPHIDÆ.

THAUMANTIS LOUISA.

Th. louisa, Wood-Mason, P. A. S. B., July 1877, p. 163.

♂ *Th. alis supra albis, anticis dimidio basali, posticis partibus duabus basalibus lætissime et purissime fulvis; singulis, ut in Th. howqua, fasciâ submarginali lunularum cum maculis hastiformibus coalitarum saturatissimè violaceo-fusca, ornatis; lunulis maculisque alarum posticarum valdè majoribus: alis infra luteo-fulvis, anticarum parte media sola alba luteo vix tincta; strigis quatuor sinuatis, duabus basalibus saturate brunneis, alterisque duabus submarginalibus obsoletis et tantum ad angulum analem brunneo-coloratis; anticarum ocellis omnibus (5) obsoletis, posticarum au-*

tem duobus (intermediis tribus obsoletis) rufis, pupilla alba, iride tenui nigra.

Expans. alarum antic. unc. 5 lin. 3.

Habitat in Tenasserim in montibus "Taoo," dictis ad alt. 3—6000 ped.; O. Limborg detexit.

This fine and distinct species belongs to the same division of the genus as *Th. camadeva*, *Th. nourmahal*, *Th. cambodia*, and *Th. howqua*, to the last of which it is most nearly related, but from which it differs in having the upper surface of the wings white and fulvous instead of fulvous throughout, and in having five spots, the red rings of the ocelli, on the under-surface of the fore wings, and only two well-developed ocelli on the hinder wings, instead of three and five ocelli respectively.

Both the specimens obtained are males and each is furnished, like the same are in all the allied species and in some at least of those belonging to the other section of the genus, with a tuft of erectile hairs situated on the upper surface of each hinder wing near the base of the organ. Dr. Fritz Müller has recently communicated to the Entomological Society of London a valuable paper in which the tufts of hairs and the glandular patches he has discovered on different parts of the body in the males of many Brazilian *Lepidoptera* are considered to be odoriferous organs serving, in all probability, to attract the females. In the species of *Thaumantis* the tufts by their erection probably serve to scatter a scented secretion poured out by skin-glands at their base; and I hope that some one of the three gentlemen (Major Badgley and Messrs. Peal and Mandelli) who are located in districts in or near to which two of the species* (*Th. camadeva* and *Th. diores*) abound, will before long examine living specimens of the male of one or the other of these species so as to be able to tell us whether these structures are odoriferous or not. The accompanying plate is from a characteristic coloured drawing of the typical specimen (presented by me to the Oxford Museum) by Professor Westwood, Hope Professor of Zoology in the University of Oxford.

* Short descriptions, by the aid of which and of that of the accompanying illustration any one ought to be able to recognize these two species, are subjoined:—

Th. camadeva, has the fore wings above white tinged with leaden blue, brown at the base, and with a submarginal band of blotches and another of lunules fuscous; the hinder wings fuscous brown at base and with a band of leaden white lunules behind the middle; and five red ocelli, each provided with a black iris-like ring, on the under surface of each of the four wings. The expanse of the fore wings is $4\frac{1}{2}$ inches. The species is well-figured by Westwood in his 'Cabinet of Oriental Entomology,' pl. iv.

Th. diores belongs to the other section of the genus: it is to be recognized at a glance by the fuscous black upper surface of its wings, each of which has in the centre a huge band or spot of indescribably brilliant metallic changeable blue; on the fore wings this spot is much paler and less changeable externally, while on the hinder wings it is paler in the centre. Expanse $3\frac{3}{4}$ — $4\frac{1}{4}$ inches.

XIV.—*Great Snow-fall in Kashmir.*—By R. LYDEKKER, B. A.

Among the inhabitants of the Kashmir Himalaya, the winter and spring of 1877-78 will long be memorable on account of the enormous quantity of snow which then fell on their mountains and valleys, and still more on account of the grievous famine which followed this excessive snow-fall. So excessive indeed was this snow-fall, that no tradition or record exists even among the oldest inhabitants of anything approaching to such a fall. I have therefore thought that a short account of this abnormal snow-fall, and of the destruction inflicted by it on the indigenous animal life, might be thought not unworthy of a place in the records of the Asiatic Society, and have accordingly put together the following notes :

Early in the month of October 1877, snow commenced to fall in the valley and mountains of Kashmir, and from that time up to May 1878, there seems to have been an almost incessant snow-fall on the higher mountains and valleys ; the inhabitants have indeed informed me that in places it frequently snowed without intermission for upwards of ten days at a time. It is extremely difficult to obtain from the natives any correct estimate as to the amount of snow which fell in any place ; but at Dras, which has an elevation of about 10,000 feet, I estimated the snow-fall from the native account as having been from 30 to 40 feet thick on the level.

The effects of this enormous snow-fall are to be seen throughout the country. At Dras, the well-built-travellers' bungalow, which had stood, I believe, some thirty years, was entirely crushed down by the weight of the snow which fell on it. In almost every village in the neighbouring mountains more or less of the log-houses have likewise fallen ; while at Gulmarg and Sonamarg, where no attempt was made to remove the snow, almost all of the huts of the European visitors have been utterly broken down by the snow.

In the higher mountains, whole hill-sides have been denuded of vegetation and soil by the enormous avalanches which have swept down them, leaving vast gaps in the primæval forests and choking the valleys below with the debris of rocks and trees.

As an instance of the amount of snow which must have fallen on the higher levels, we will take the Zogi-pass, leading from Kashmir to Dras, which has an elevation of 11,300 feet. I crossed this pass early in August last, and I then found that the whole of the ravine leading up to the pass from the Kashmir side was still filled with snow, which I estimated in places to be at least 150 feet thick. The road at that time was carried over the snow up the middle of the ravine ; the true road which runs along one bank of the ravine being still entirely concealed by snow. It seemed to me

quite impossible that even half the amount of snow then remaining could be melted during the summer.

I heard subsequently from a traveller who crossed the pass on the 5th of September, that the road was then just beginning to get clear from snow, and that some of his loads were carried along it, while others were taken over the snow in the ravine.

In ordinary seasons this road on the Zogi-pass is clear from snow some time during the month of June; if we refer to page 223 of Mr. Drew's "*Jammoo and Kashmir Territories*," we shall find that in speaking of this pass, he says, "About the beginning of June the snow-bed breaks up, and the ravine is no longer passable."

It is thus apparent that the road across the Zogi-la was not clear of snow during the past summer until three months later than it is in normal seasons, while the ravine early in September was still filled with snow. I crossed the same pass in August 1874, and at that time there was not the slightest trace of snow to be seen anywhere on the pass, or in the ravine leading up to it. As another instance of the great snow-fall, I will take the valley leading from the town of Dras up to the pass separating that place from the valley of the Kishenganga river. About the middle of August, almost the whole of the first-mentioned valley, at an elevation of 12,000 feet, was completely choked with snow, which in places was at least 200 feet in thickness. In the same district all passes over 13,000 feet were still deep in snow at the same season of the year. In ordinary seasons the passes in this district which are not more than 15,000 feet in height are completely cleared of snow at the beginning of August, except in a few sheltered ravines. During last summer, however, it was quite impossible, that the snow could have even melted on the passes.

Traces of this great snow-fall were even to be observed in the outer hills in September, since at the end of that month, I saw a patch of snow resting in a hollow of the Haji Pir ridge above Uri, which is only a little over 9,000 feet in height. The Thakadar of this place told me that he had never before seen snow there after the beginning of June.

It is almost unnecessary to point out, that if a snow-fall similar to the above were to be of constant occurrence in the Himalaya, the permanent snow-line would lie at a much lower level than it does at present, and that the glaciers would greatly increase in size, and descend much lower into the valleys.

In conclusion, it remains to notice the destruction of animal life caused by this unusual snow-fall. In the upper Wardwan valley I was told by some European travellers that they had several times seen numbers of Ibex embedded in the snow; in one place upwards of sixty heads were counted, and in another the number of carcasses was estimated by my informant as

little short of one hundred. I myself twice saw some fifteen carcasses of small Ibex embedded in the snow-drifts of the Tilail valley.

The most convincing proof, however, of the havoc caused among the wild animals by the great snow-fall, is the fact that scarcely any Ibex were seen during last summer, in those portions of the Wardwan and Tilail valleys, which are ordinarily considered as sure finds. Near saline springs in the latter valley, Ibex are always to be found in the later summer, but this year I only heard of one solitary buck, probably the sole survivor of a herd, having been seen at these salt-licks. The native shikaris say that almost all the Ibex have either been killed by the snow, or have migrated into Skardo where the snow-fall was less.

The Red-Bear (*Ursus isabellinus*) was also far less numerous during the past summer than in ordinary seasons, and the shikaris say that numbers of them have perished, owing to their winter quarters having been snowed up so long that the occupants perished from hunger.

The same explanation will probably account for the fact that in the higher regions I found many of the marmot burrows deserted.

Much has been said lately as to the destruction inflicted on the game of the Kashmir Himalaya by the rifle of the European sportsmen, but I think that the destruction caused by the snow of the past winter has far exceeded any slaughter which would be inflicted by sportsmen during a period of at least five or six years.

XV.—*Physiographical Notes &c. on Tanjore (Tanjá-úr).*—By LIEUTENANT-COLONEL B. R. BRANFILL, *Deputy Superintendent, Great Trigonometrical Branch, Survey of India*,—Communicated by COLONEL J. T. WALKER, C. B., R. E., *Surveyor-General of India*.

The Tanjore district of the Madras Presidency is nearly contained within an equilateral triangle of 75 to 80 miles on each side, on the Coromandel coast (Chóramandal = Chólan's region) immediately south of the river Kolladam (*Anglice* "Coleroon"), which is the north and north-west boundary, running S. W. by W. 75 miles inland from the river mouth. The Bay of Bengal forms the east side, running from the same point nearly 75 miles due south to Point Calimere (Kalliméd). The third side is an irregular line of much the same length from Point Calimere to the "Cauvery" (Kávéri and Kolladam) 10 miles east of Trichinopoly (Trisirápalli). This triangular area contains about 3,000 square miles, two thirds of which is Kávéri delta, and two thirds of this portion, or about 1,400 square miles

is irrigated, and there is scarcely another acre of it that could be profitably brought under irrigation. In addition to this, some 650 square miles of undulating country, running 40 miles to the southward along the shore of Palk's Bay to the Pámbanár, the border of Shivagangai Zamindári estate (Madura District), and extending 12 to 20 miles inland, also belongs to Tanjore. But the scope of these notes does not embrace more than the deltaic portion of Tanjore, the country to the south having been traversed the previous season, and reported on.

Although there are several places named "hill" (malai), or "mound" (médu), there is nothing at all worthy to be called a hill, except the *dunes* or sand hillocks along the sea-board, the height of which (at Negapatam) barely attains an elevation of 50 feet above sea level, and a few insignificant sand-drifts in the E. N. E. corner of the delta, near the mouth of the Kolladám river.

The whole delta consists of an even plain of alluvial deposit containing a comparatively large proportion of sand and having a good slope of 3 or 4 feet per mile. The fall, however, decreases as the coast is neared to 2 feet per mile or less. The following particulars of slope are from the railway levels of the South India Railway, according to which the bed of the Kávéri for nearly one hundred miles, from Karúr to within 30 miles of the present coast line, has a pretty even fall of near 4 feet a mile. The next 10 miles the gradient decreases to about 3 feet per mile, and the next to within 10 miles of the coast to 2 feet per mile.

Continuing the examination of the declivity (by means of the recent Government Hydrographic or Marine Charts), the fall of the ground out at sea beyond the coast line increases in the first fourteen miles to 5 or 6 feet per mile, to 8 or 9 feet per mile for the next nine miles, to 24 feet per mile for the next six, and to 38 feet per mile for the last ten miles examined up to 37 miles from the coast. This rapid deepening of the sea is a noticeable fact, but it seems only natural if the present coast line is of purely fluvial formation.

The character of the alluvium alters and generally deteriorates in fertility as the distance from the head sluices of the Kávéri channels increases. It varies from a rich red or black loam to a pale sandy clay, the sand increasing and the clay diminishing from west to east, and but for the annual fertilizing floods would be anything but rich and productive. Without artificial manure the land usually bears but one crop yearly.

The sea-board flats are usually well raised above sea-level, and further protected from high tides and storm waves by a high sand-ridge along the coast. Cyclones have been frequent on the coast, but have not made the great devastating inroads they appear to have made elsewhere on the coast. The formation of this coast-ridge or sea-wall appears to be

explained by the strong sea breezes which prevail in the hot and dry season, and, blowing strongest at the hottest part of the day, when the sand of the sea beach is driest and most easily raised, continually drift it up inland to accumulate under the shelter of the coast vegetation.

It is thus formed into a ridge, or line of hillocks, parallel to the shore-line at the inner and upper edge of the beach, frequently standing at a steep slope on both sea-ward and land-ward sides. The blown sand does not appear to extend far inland, being kept down by the fringe of palms and other vegetation that usually grows near the coast. This advanced vegetation equally protects the sand-ridge from being blown down again and out to sea in the violent westerly winds of the south-west monsoon.

This coast sand-ridge is a common feature on the coasts of Southern India, and it seems likely that the devastating storm-waves which have visited the coast have only or chiefly destroyed the towns and villages that were unprotected by it, such as those most conveniently situated for trade at the mouth of a river or inlet, and those opposite to a muddy coast line where there is no sand that will drift. In such places (in the number of which Madras may be included), it would be prudent to raise an artificial wall or 'levée'; a small price to pay for immunity from such a calamity as befel Masulipatam in 1864, when many thousands of persons* perished miserably, and such as has probably swept out of existence many a flourishing port on the Coromandel Coast.

As to whether the coast line of the Kávéri delta is altering, it may be well to consider the elements of change at work. We notice first the silt-bearing floods of the autumnal rains, which are doubtless yearly raising the level of the land generally and tending to make it encroach on the sea, extending the coast line eastwards and shoaling the sea-bed, a slow but unceasing process, albeit the effects may seem to wax and wane and even to contradict what must inevitably occur sooner or later. The process of new land-formation may be much slower now than it was before the great irrigation works were begun, but so long as fresh silt is brought down by the annual floods, it cannot cease altogether. The heaviest grains are dropped first as the current slackens, whilst the lightest are carried on until the river current is lost in the quiet depths of the open sea.

The next element of change is the wind, which acts both directly and indirectly and in various ways. First, there is the north-east monsoon (wind), acting indirectly by means of the southward, long-shore current which carries the silt-bearing floods more or less down the coast, and so to deposit their heaviest burden to the south of the river outlets, thus commencing the sand-banks which help to shift the river mouth northwards. This wind cannot act directly on the shore sand to the north of

* 30,000 persons are stated to have perished in one night.

the river mouths, because the sand is then moist from the recent autumnal rains, the heaviest rain of the year, and therefore unmoved. But the southward set of the rollers and beat of the surf must tend to drift the shore-sand loosened by its violence, southward across the river mouths, which it shoals, helping to form the bar of sand-banks and islands usually formed in such situations.

In January and February the north-east monsoon (wind) gradually changes into land and sea breezes, which increase as the spring advances with clear weather and a hotter sun. The sand of the sea-shore rapidly dries and is drifted by the sea-breezes to the top of its slope, as long as there is loose sand to drift and nothing to shelter it.

The sea-breezes veer gradually to the south-east and southward until in May they become strong '*long-shore*' winds from the south, directly transporting northward much of the blown sand collected along the coast-ridge, in clouds of dust which settles in the hollows and tends to fill up and choke the southern edges of the river out-falls and so to shift them northwards.

With the change of wind from the north-east in January to south-east and south in April and May, the '*long-shore*' current changes from south to north, latterly running rapidly northwards and bringing in the heavy sea-rollers obliquely to the coast from the south-east, to dash in lines of roaring surf on the shore, washing the sand of the beach northwards at every stroke. This double action it is (perhaps chiefly) that drives the river mouths northwards.

Whether this is the right explanation or not, the fact remains that the mouths of the rivers of the Coromandel Coast are continually shifting northwards.

This is seen best in the Mahánadi and Kávéri; also in the Pennér (Pináka), Nagari river, Kordaliyár, Kú-am, Pálár and Vaigai.

It is less noticeable in the Gódávéri, Vellár, and Támraparani. The Kistna seems to contradict this tendency, and the Gódávéri also has one outlet apparently to the south of its delta, but these apparent exceptions probably admit of some explanation. On the west coast, the Nétrávati exhibits a similar tendency to make its outlet into the sea considerably north of the spot it seems to be going to, as it approaches the coast. The northward shifting of the Nétrávati mouth is probably due to the northward set of the current, and the violent beat of the breakers during the south-west monsoon, which has nothing to counter-balance it. It seems probable that where the beach is sandy, the same tendency of the river-mouths to shift northwards may be observed in Ceylon.

After shifting for an indefinite period to the north, during which it seems probable that the bed of the river must be silting up, especially

near the outfall where the current is less, some unusually high flood may be expected to top the bank and thus form a new outlet to the south. This may possibly occur near the head of the delta, and the new channel may take its course along the southern edge or border and recommence the process of shifting its mouth northward again. This may be the explanation of the Kistna apparently flowing along the southern border of its delta; it also points to a possibility of the Kávéri doing the same thing some day.

When a river has opened a new mouth and abandoned the whole or a portion of its course, especially that which ran parallel to the coast, it seems only likely that a lagoon or *back-water* will be formed, which will sooner or later silt up and eventually be reclaimed entirely from the sea.

Having thus considered the causes of the northward shifting of the river mouths on the Coromandel Coast, to which the Kávéri has been subject continually during the formation of its delta, to the east of Trichinopoly, the probable history of its more recent inland course offers itself for consideration.

Dr. Burnell of the Madras Civil Service states he has met with no mention of the Kolladam (Coleroon), which is now the principal bed of the lower Kávéri, by the early geographers, and thinks that the channel which passes by Kumbakónam and Máyaveram and enters the sea at Kávéri-paṭṭanam, having retained the name of Kávéri throughout its course, was the main channel of the river till the 10th or 12th century.

From Ptolemy's map of the Coast of India, it would appear that 1,500 to 2,000 years ago, there was a spit of land jutting out into the sea at the Kávéri mouth near "*Chaberis Emporium*" (Kávéri-paṭṭanam), of which there is now no trace, either above or below the sea-level contour line.

Such a spit or shoal would, however, naturally disappear if the river mouth shifted, or if any thing stopped the deposition of silt which formed it, and this must have happened when the great irrigation works at the head of the delta were constructed.

At present the Kávéri-paṭṭanam mouth of the Kávéri is nearly silted up, and the principal outlet of the surplus flood-water is now by the mouth of the Kolladam, where, according to recent maps, a new deltaic projection and shoal are forming.

The great irrigation works are supposed to have been constructed in the 10th and 12th centuries, but local traditions represent them as early as the year 200 A. D. In any case, the delta has been under irrigation from time immemorial. The story of the Kávéri main channel would seem to be somewhat thus:—After some long period of silting up from the deposit left by the annual floods, the river in some unusual inundation must have overflowed its banks and found a new and easier course.

This diversion may have occurred either above or below what is now the island of Srirangam, lying like a sand-bank in mid-river. If it occurred above, it seems likely that the new channel or northern branch (the Kollaḍam*), soon became the deeper bed of the two, and then either approached and threatened, or actually breached the north bank of the southern or old Kávéri branch below the island, and the 'grand anaikat' (dam or weir), which is strictly a river-wall or 'levée', must have been built to prevent or repair a breach.

If, on the other hand, the breach or bifurcation occurred below Srirangam, the 'grand anaikat' was probably made to repair it and keep the stream back in its own channel: but if so, the attempt was ineffectual, for the river must have then formed a new bed for itself, some miles higher up the channel, at a point nearly opposite a place marked on the map (Indian Atlas, Sheet 79) as 'Palaya Cauvery' (Old Cauvery).

In either case, the northern channel, which flows along the left or northern border of the delta, and immediately under the gravel uplands of north-east Trichinopoly, became the deeper and wider one, carrying off the high floods, whilst the south or old Kávéri branch, kept at a higher level with impeded stream and checked by numerous irrigation works, gradually silted up and threatened to leave Tanjore unwatered, for the bed of the Kollaḍam was too deep to admit of irrigation channels being profitably led from it. The difference of level of the two beds at the grand anaikat is variously stated to have been from 10 feet to 20 feet early in this (19th) century and to be rapidly increasing.

In this state the British Government took charge of the district and, after trying many other expedients to save and restore the Kávéri irrigation, in 1836 constructed first the upper anaikat, a weir or dam across the head of the northern branch or Kollaḍam, in order to raise the stream, so as to flow into the Kávéri Proper or southern branch. This proved more than sufficient in times of high floods, and there was danger of overwhelming Tanjore by a sudden inundation from pouring in an excessive supply. To remedy this, sluices were formed in the 'grand anaikat' to provide an escape for the sand and surplus water that was not wanted, and finally a head-sluice or regulating dam was made across the Kávéri channel where it enters the delta, below the 'grand anaikat,' thus giving the means of regulating the supply as desired.

The Kávéri proper continues its course through the delta with a

* ? Kolai-(y)-iḍam = 'Slaughter place', from a legend that men were cast into a chasm through which the Kávéri had disappeared, in order to fill it up; a story that looks as if a human sacrifice had been performed at the repair or filling up of a great breach. Kolláyi = a breach in a bank (Gundert). Another suggests Kilai-y-iḍam = 'bifurcation-place', from kilai, a branch, bifurcation &c.

continually diminished stream, giving off numerous supply channels all the way to the Coast, when little stream remains to enter the sea at Kávéri-paṭṭanam or Kílúr ('*East-bourne*').

There is no projection beyond the normal (north and south) line of the coast here, nor any spit or shoal to witness to any old projection of the river mouth, nor do the Marine Chart soundings indicate anything of the kind. That the diminished stream flows in its old bed, is proved by the name of the channel and the port at its outlet, and also by the traditions at the places on its course, Kumbakónam, Máyaveram &c., where the sanctity of the Kávéri water is still highly esteemed.

The other and now chief branch, the Kollaḍam, takes a north-easterly course, keeping more and more to the northward along the low ground that probably existed on the north edge of the Kávéri delta, and has, by its rapidity and volume, made for itself a deep and wide bed, too deep below the surface of the country to allow of irrigation channels being led from it, and in most places three-quarters of a mile in width. To utilize the surplus water escaping to the sea by this channel, the 'Coleroon lower anaikaṭ' was built, to supply the Máyaveram and Shi-yáli Táluks of N. E. Tanjore, and the Chidambaram ('Chilambram') Táluk of South Arcot.

The water overflowing the final anaikaṭ flows with a greatly retarded current and in a very tortuous course along the last few miles before it enters the sea near Dívu-kóṭai ('*Isle-fort*', the "Devikotta" of Atlas Sheet No. 79), the name of which indicates, that it was on an island when first named (tívu being the Tamil form of the Sanskrit dvípa, *an island*).

Notwithstanding published statements to the contrary, it appears that sand-banks are still forming at the mouth of the Kollaḍam, and the Marine Chart of the coast gives the position of a shoal called the "Coleroon shoal," whence Porto Novo, or Muhammad (? Mahmúd) Bandar, seems likely to be left far inland in course of time.

The direction of the Kollaḍam bed being more north and south than that of the so called S. W. monsoon wind—of which fact, there is ample proof in the permanent eastward set of the stems, twigs and branches of the trees exposed to it—the fine blown sand of the river bed in the dry and hot season (April and May), is drifted up into heaps and lines along the southern or right bank of the river, tending to form a natural river wall there and to keep the stream nearer to the northern bank.

The Kávéri delta is only about 10 miles in width at Tanjore and it is flanked by comparatively high ground, composed of previous sedimentary formation, stratified beds of laterite, conglomerate and mottled grit, with quartz pebbles mixed, through which the river first cut its way, whilst depositing the material of its present delta.

* Locally "Annakarai" or Dam-bank.

There are some 50 or 60 different river channels, by which the Kávéri water is distributed for irrigation, or for drainage over the whole extent of the delta, the names of which being mostly derived from those of reigning princes, should throw some light upon the history of the country, for there are representatives of the old Pándiyan and Chólan dynasties, who reigned before the 16th century, as well as of the Telugu Nayakans who superseded them, and possibly also of the Mahrattas whom the British Government succeeded. There are thirteen tidal mouths of the Kávéri that enter the sea and are more or less navigable for small boats.

There has been little change in the principal river channels of late years, due in a great measure to the conservative measures adopted under the British Government, and to the great regulating works, constructed for keeping the floods under control. There must be a tendency for the channels to silt up, as well as for the whole of the irrigated part of the delta to rise, but there seems to be no apprehension at present of danger to the province from this source.

Near the coast, and more particularly at the south-east corner of the delta, towards Point Calimere (Kalliméd), there are extensive salt-swamps, with patches of jungle and desert.

The Kóḍikarai salt-marsh covers nearly 100 square miles, being about 20 miles long east and west, and 5 miles wide north and south. It is used as a vast salt-pan under Government supervision. The two highest spring tides of May and June (called by the natives 'Chittrai Parvam', 'full-moon of April and May', and Visákha Vellam, 'May—June flood') overflow the sea-wall and fill the swamp with brine, which is, in favourable seasons, soon crystallized under the evaporation from the sun and the dry west winds. The south-east and southerly breezes that prevail in May, probably combine to make the spring tides of this season unusually high.

A considerable degree of sanctity is locally attributed to Védáran-yam, ('Véda-forest') and to Kóḍikarai ('Promontory-shore') from a tradition that here, as subsequently, at the Rámésvaram promontory, the mythic hero Ráma tried to make a causeway to Lanka, Ceylon. There is now daily postal communication by open boat, between India and Ceylon at this place.

An impression exists that this sea, Palks Straits and Bay, is silting up, but this process must be exceedingly slow, inasmuch as no large rivers now discharge any large proportion of their silt into this receptacle. The Vaigai (? Veghavati) outlet scarcely ever discharges, and as more irrigation works are introduced, this proportion must diminish.

Still this is to a great extent an inland sea surrounded by a sandy shore from which the land-breezes and strong southerly and westerly winds must bear some drift to deposit. Moreover, the northward beat of the surf

along the north-east Coast of Ceylon from April to September, and the southward beat along the east Coast of Tanjore from November to January, must tend more or less to shoal the entrance to Palk's Bay from the Bay of Bengal.

This sea was known to the old geographers as *Sinus Argaricus* (Colonel Yule's map of ancient India has *Sinus Argalicus* for Palk's Bay, and a town marked at the mouth of the Vaigai named "Argari? Argalu? Marallo? (Maravár)"; I would venture to suggest that the sea may very likely have been so named from *Anaikarai*, *The barrier, cross-bank or dam-bank*, by which term the great natural 'bund' or causeway, Adam's bridge, between India and Ceylon was probably known. The early Arabian voyagers knew it as (and thence called the country beyond it) 'Ma,abar', *i. e.*, *The ford, ferry or passage*. I understand, however, that the name appears in Ptolemy as *Ανχαρονπόλις* (? *Anakarai-town*) from which the Bay may have been called, and, if so, this town may have been the old town now called Attankarai (from *Aru* a *river*, and *Karai* a *bank, shore*) situated at the old mouth of the Vaigai river.

It is an interesting question whether the line of sand-banks and islets forming 'Adam's bridge', between Rámésvaram and Mannár, is undergoing any permanent change. I could learn nothing reliable on the subject when I was there in 1874, '75 and '76, but it can scarcely be at a perfect stand-still. On the one hand, there appear to be traditions that at one time it was possible to walk across at low water dry shod, but I could not learn that this had actually occurred within modern historic times. On the other hand, it would appear that there was a considerable trade carried on between Arabia and China through these Straits, and one would hardly suppose that it could have been carried on in such small vessels as can alone have passed through the passages in "Adam's bridge" previous to the excavation of the Pámban channel by the British Government, unless there were passages that have silted up since. Dr. Burnell tells me, he has a reliable Portuguese MS. of 1685, by a Captain J. Ribeiro, stating that there was then "no passage, except two narrow canals, one by Ramanacor and the other by Manar"; and that "a small 'sumaca' only can pass by either at high water."

At the present time, there is a single channel at Mannár answering this description, and none elsewhere, except the new passage at Pámban, which has been cut artificially through the rocky reef at a place where in quite recent times, the old built-stone causeway had been breached by storm-waves (in 1484 and since) which also destroyed the adjacent town on the spit of land west of Pámban between Tóni-turai and Vettilai Mandapam.

The surf beats heavily all along "Adam's bridge" during both mon-

soons, and a strong current sets constantly the same way as the wind; at other times the current varies with the tide, and one would suppose that no sand-banks could withstand the violence of the wash over them at every change of tide. Still the islets and sand-banks do remain as a whole, albeit probably in a state of frequent change individually. But the growth of coral is active here, and new islets are said to be forming where there were none, and old ones increasing.

The blown sand too, seems to have some effective element of conglomeration in it, by which sand-stone is forming constantly. If, however, the available waterway is curtailed by new islets and sand-banks, it would appear likely, that the passage between them must probably become deeper by the increased violence of the water that has to pass. It seems therefore likely, that the land may gain superficially on the sea in Palk's Straits, but equally so that some of the channels may remain as deep as hitherto, or possibly become even deeper for an indefinite time to come.

Tanjore appears to have been occupied from very early times by Tamil people, over whom the Chólan or Sóran dynasty held sway for many centuries prior to the 16th century, and their country was known as the "Chóramandalam" (whence Coromandel).

The Chólan capital was at different times at Káncipuram (Conjeve-ram); at U'raiýúr, near Trichinopoly; at Tanjore; at Kumbakónam and other places.

The Telugu Nayaks succeeded the Chólan kingdom and ruled in Tanjore for more than a century up to 1675, when the Mahratta princes superseded them, and ruled till they were superseded by the British Government.

The Chólan rulers seem to have done most good for the country by elaborating the extensive system of irrigation, to which the present Government has added little but restorative, conservative and regulating works, of the greatest value no doubt, but no fresh channels have been made. They also built many of the great Hindu Temples, of which there are no less than 3,000 in Tanjore, and their endowments still remain, but the management of many of these is in a deplorable state of neglect, and the temples fast going to ruin. Witness Tirupálturai, Gangaikandapuram, Mannárguði and others.

The Nayakan rulers also have left their mark on the country in the numerous Mandapams (open temple halls), Chattrams, (native alms, and rest-houses) and many other buildings, showing their peculiar Indo-Moorish style of architecture, having vaulted roofs and pointed arches, the best specimen of which that I have seen is the palace of Tirumala Nayak at Madura, built about 1650.

A very noticeable fact in the Tanjore delta is the comparative scarcity of forts and fortified towns. The inhabitants appear to me to be

unusually and seriously industrious, and to have a smaller admixture of the warlike classes than any of the South-Indian districts I have passed through. They have been habituated to agriculture for so long that the vice of war has died out, and the people seem too busy and well off to revive it.

The Nayaks do not seem to have introduced many immigrants of Telugu race; the neighbouring warlike tribes of Kallans and Maravans are also absent from the deltaic part of the country, and the pastoral tribes are only found in the more forested tracts beyond the delta.

It is stated that with the exception of a short experience of Muhammadan rule under Haidar 'Ali (in 1780), there is no record of the country having suffered from famine, although food prices have risen very high during the prevalence of famine in adjacent districts.

There is one patent reason for the country not having been harassed by fire and sword, which is, that it was impassable for troops, or could be easily made so, for half the year or more, and *that* in the cool and fine season of autumn and winter, when the rice-fields are all under water. Besides this, there were no made roads in the delta fit for wheeled traffic, except in the dry season. Pack cattle are much used even now.

The irrigated part of the country is now well supplied with raised roads, but even these for the most part are almost useless for any large amount of wheel traffic in the wet season, because they are unmetalled, or only metalled with the ordinary river sand from the channels: and it appears marvellous how a thriving population can be content to pass several months confined to their villages as it were in islands, surrounded by a sea of deep mud, with only doubtful pathways for communication along the narrow and irregular banks dividing the rice-fields. The river channels, when in flood, are not commonly used for communication or traffic. The British Government made some of the channels navigable by means of locks &c., but these have become completely disused, and replaced by railways.

The climate of the Kávéri delta is mild and moist, compared with that of the adjacent districts, due no doubt to its situation on the coast and the great spread of irrigation water. The annual course of the weather is somewhat thus:—

During January the weather is cool and fine with fresh north-east breezes.

In February the wind is lighter and more easterly. Heavy fogs are common night and morning, succeeded by hot days. The rice crop is cut and the country quickly drains dry.

In March, April and May the wind is variable. Near the coast, land and sea-breezes prevail. The hot weather sets in, fields become bare and parched, and the heat increases greatly. Latterly, southerly and south-westerly winds set in, and occasional thunder-storms occur to clear and

cool the air, and an occasional partial 'fresh' comes down the Kávéri channels.

In June, strong westerly winds prevail with much dust and dry heat.

In July, August and September, the river channels fill from the south-west monsoon rain on the western gháts, also from occasional local falls of rain. Early rice cultivation begins, and the westerly winds gradually fall, to be succeeded by calms and variable winds.

In October and November, the wind sets in from the north-east, and heavy falls of rain occur, the temperature falls considerably, and rice cultivation is carried on to the utmost extent.

In December, the weather becomes fine and the wind more steady from the north-east.

The population of Tanjore is dense, being nearly 2,000,000 for an area of 3,700 square miles, giving an average of 540 per square mile, but it amounts, in the richer parts, to 1,000 per square mile. It is composed chiefly (two thirds) of Hinduized local tribes and one third of settlers.

GROSS NUMBER.		CASTE OR RACE.	No.	EMPLOYMENT.
1,804,000	1,200,000 Hindus of local des- cent.	Vanniyan (Kallar?).	574,000	Labourers.
		Paraiyan (Pallar ? &c.)	350,000	Menials.
		Sambadavan.	118,000	Fishermen.
		Idaiyans, Sánán, &c.	158,000	Herdsmen, potters, washers, &c.
	604,000 Immi- grants.	Vellálan.	348,000	Cultivators.
		Brahman.	127,000	Land and house- owners, scholars, idlers, &c.
Chetti, &c.		129,000	Weavers, artificers, merchants, &c.	
103,000	Muhammadans, principally Labbé.		Trade, horticulture, &c.	
66,000	Christians.			
1,000	Others.			
TOTAL, 1,974,000				

There are said to be no wild or aboriginal tribes in the district.

Although the famine was scarcely over, in the beginning of 1878 there were no signs of distress visible, but all the people seemed well off. On the contrary, the upper classes seemed to be all the wealthier. Bricks were being made and burnt everywhere. New houses and buildings were being erected, and the effect of the famine appears only to have enriched the dwellers in this land of rice-fields. The labouring population being paid in grain as usual, the high prices prevailing elsewhere did not affect them.

XVI.—*On the proper relative Sectional Areas for Copper and Iron Lightning Rods.*—By R. S. BROUGH.

So far as mere conductivity is concerned, a comparatively thin wire of either copper or iron would suffice for the loftiest building; but such a thin conductor would be dangerous, because it would be fused by a heavy discharge of lightning.

Now the problem is to determine what relative sectional areas should be given to copper and iron rods, in order that neither should be more liable to fusion than the other.

The usual answer given, is, that an iron rod should have 4 times the sectional area of a copper rod.* This result is, I suppose, arrived at in the following way. The conductivity of copper is about 6 times as great as that of iron, but the melting point of iron is about 50 per cent. higher than that of copper, therefore $\frac{6.0}{1.5} = 4$, is the ratio for the sectional area of iron to copper.

This simple treatment of the problem, however, is incomplete, because it neglects to take three most important factors into consideration, namely, (1) the influence of the rise of temperature in increasing the electrical resistance of the metal, (2) the difference between the "thermal capacity" or "specific heat" of copper and iron, and (3) the fact that the iron rod being made several times more massive than the copper rod, it will require a proportionately greater quantity of heat to increase its temperature. These omissions introduce an enormous error in the result.

The effect of the passage of a discharge of lightning through the rod will be to raise its temperature.

The temperature (T) to which a given length of the rod will be raised will depend on

- (1) The quantity of heat developed by the discharge.
- (2) The mass of the rod.
- (3) The "Specific heat" σ of the metal composing the rod.

This may be expressed mathematically as follows :

$$T = \text{Const.} \frac{H}{\sigma m}$$

where m is the mass of the unit length of the rod, which we shall assume to be uniform in sectional area throughout its length, and H is the quantity of heat developed by the discharge.

* War Office Memorandum by Sir Fred. Chapman, R. E.

We may take $\sigma = 0.1013$ for copper, and $= 0.1218$ for iron. These figures were only verified by Dulong and Petit up to 300°C . It is probable, however, that their ratio, with which we are only here concerned, would not greatly alter at higher temperatures. At any rate, comparing the specific heat between 0° and 100°C , with that between 0° and 300°C , we infer that any alteration would be in favour of iron, *i. e.*, that the specific heat of iron would increase in a quicker ratio than that of copper.

Adopting the centimetre as the unit of length, the mass of one centimetre of the rod $= \rho a$, where a is the sectional area of the rod in square centimetres, and $\rho = 8.9$ for copper and $= 7.8$ for iron.

Further, assuming the quantity and duration of the discharge to be constants, $H = \text{Const.} \times R$, where R is the resistance of the unit length of the conductor.

But $R = \frac{\lambda}{a}$, where λ is the specific resistance of the metal per cubic centimetre at its temperature of fusion.

We may take the melting point of copper as 1400°C , and that of wrought iron as 2000°C^* ; and, in order to find λ assume that Dr. William Siemens's formula, which he verified to 1000°C , holds good,† viz.—

$$\left. \begin{aligned} \lambda t &= \lambda_0 (0.026577 t^{\frac{1}{2}} + 0.0031443 t - 0.29751) \\ &\quad \text{for copper} \\ \lambda t &= \lambda_0 (0.072545 t^{\frac{1}{2}} + 0.0138133 t - 1.23971) \\ &\quad \text{for iron} \end{aligned} \right\}$$

The temperature t in these formulæ is to be measured from the absolute zero, so that we have $t = 1673$ for copper, and $t = 2273$ for iron.

The value of λ_0 per cubic centimetre of copper is 1.652 Microhms, and per cubic centimetre of iron is 9.827 Microhms.‡

Thus the value of λt per cubic centimetre of copper becomes 10 Microhms at 1673°C , and per cubic centimetre of iron becomes 107 Microhms at 2273°C .

$$\left. \begin{aligned} \text{Hence } H &= \text{Const.} \frac{10}{a} \text{ for copper} \\ \text{and } H &= \text{Const.} \frac{107}{A} \text{ for iron} \end{aligned} \right\}$$

* Rankine's Tables.

† Bakerian Lecture, 1871.

‡ Jenkin's Cantor Lectures, from Mathiessen's experiments.

$$\text{Therefore } T = \text{Const.} \frac{10}{0.1013 \times 8.9 \times a^2} \text{ for copper}$$

$$\text{and } T = \text{Const.} \frac{107}{0.1218 \times 7.8 \times A^2} \text{ for iron}$$

$$\text{Thus } T = \text{Const.} \frac{11.09}{a^2} \text{ for copper}$$

$$\text{and } T = \text{Const.} \frac{112.63}{A^2} \text{ for iron}$$

Now putting T = the temperature of fusion in each case

$$1400 = \text{Const.} \frac{11.09}{a^2} \text{ for copper}$$

$$2000 = \text{Const.} \frac{112.63}{A^2} \text{ for iron}$$

$$\text{Therefore } \left(\frac{A}{a}\right)^2 = \frac{1400}{2000} \cdot \frac{112.63}{11.09}$$

$$= 0.7 \times 10.16$$

$$= 7.112$$

Whence $A = 2.7a$ about

$$= \frac{8}{3} a \text{ about}$$

or the sectional area of an iron rod should be to the sectional area of a copper rod in the ratio of 8 to 3.





XVII.—*Description of a New Homopterous Insect belonging to the Genus Cosmoscarta*.—By W. L. DISTANT. Communicated by J. WOOD-MASON.

COSMOSCARTA MASONI, n. sp.

Pronotum stramineous, with a quadrate black spot on anterior margin; head luteous; tegmina, pectus, legs and abdomen shining black. Prosteronum with lateral borders stramineous.

Face robustly tumid, transversely strigose, with a central impunctate longitudinal impression; eyes prominent, luteous; ocelli distinct, shining, situated at about an equal distance from each other as from eyes; basal portion of the head somewhat pitchy. Pronotum thickly and finely punctured, with the lateral margins dilated and strongly reflexed, the lateral angles produced prominently outwards, and the posterior margin rounded, the disc is prominently raised and convex, across the centre of which is a faint impunctate central longitudinal line. The frontal quadrate black patch contains a deep, angular, linear impression on each side behind the eyes, and two small rounded impressions on the posterior border.

Tegmina obscurely and finely punctured; wings dark fuscous with the nervures black. Hind tibiae with a small spine towards apex.

♀. Long. ex. tegm. 17 mill. Exp. tegm. 45 mill.

Greatest long. pronot. $7\frac{1}{2}$ mill. Exp. lat. ang. pronot. 11 mill.

Habitat, Taoo, Tenasserim. Alt. 3—5000 ft.

The distinct colouration and more especially the peculiar structure of the pronotum, will serve to distinguish this fine species from any other of the genus. In the last respect its nearest allied form will be the *C. costalis*, Walk.*

This insect was contained in a collection of Tenasserim *Rhynchota* entrusted to me by Prof. Wood-Mason for determination. It is too soon to speak of their geographical affinities as a whole, but the genus *Cosmoscarta*, which was represented by two other species (*C. megamera* and *C. basinotata*), exhibits affinities which I believe will be shared by the other *Rhynchota* of this collection. *C. basinotata* has hitherto only been recorded from Borneo, and *C. megamera*, although found in N. India, has still been also received from Penang, Laos, and Hong-Kong.

* Stål no doubt correctly places this form as only a variety of *C. proserpina*, White; a species I do not possess in its typical form.



XVIII.—On the Indian Species of the Genus *Erinaceus*.—By J. ANDERSON, M. D., Supdt. Indian Museum, and Professor of Comparative Anatomy, Medical College.

(Read 4th December, 1878.)

(With Plates III, IV, V and VA.)

Dr. Jerdon* recognized only two species of Indian Hedgehog, viz., *Erinaceus collaris*, Gray, and *Erinaceus micropus*, Blyth, distinguishing the former as the North Indian and the latter as the South Indian hedgehog. But besides these, the following supposed species had either been described or indicated as belonging to the Indian and Himalayan fauna, before the publication of Jerdon's work. They were as follows, according to priority, viz., *E. spatangus*, Bennett,† *E. grayi*, Bennett‡ *E. mentalis*, Gray§ (not described) and finally *E. nudiventris*, Horsfield.|| The two first of these were stated by Bennett to be from the Himalayas, while Gray recorded *E. mentalis* from India, and Horsfield *E. nudiventris* from Madras.

Dr. Jerdon doubtfully considered *E. grayi* as identical with *E. collaris*, and *E. spatangus* as the young of *E. grayi*, but he did not pass any opinion on the undescribed *E. mentalis*. In 1841, Wagner described a hedgehog under the name of *E. albiventer*,¶ and considered it as probably of Indian origin. On the strength of this opinion Jerdon was disposed to regard it as possibly *E. micropus*. Dr. Peters, however, very kindly arranged with the authorities of the Museum at Munich that the type of *E. albiventer* should be sent to him for comparison with a specimen forwarded to him by me, and which I then believed to be *E. micropus*, but which now proves to be a nearly allied species named by Stoliczka *E. pictus*.** This latter species, however, is so closely allied to *E. micropus*, in the structure of its feet, that the comparison instituted between its feet and those of *E. albiventer*, conclusively proves that the latter is a perfectly distinct form from both, as it only possesses 4 toes in the hind feet, whereas *E. micropus* and *E. pictus*, like all the other Indian species of hedgehogs, have 5 toes in the hind feet. Dr. Peters is of the opinion that *E. albiventer*, is probably the young of *E. heterodactylus*, Sundvl. from Africa.

* Mammals of India, 1867, p. 62.

† Proc. Zool. Soc. Lond. 1832, p. 123.

‡ l. c. p. 124.

§ List. Mamm. B. M. 1851, p. 81.

|| Cat. Mamm. East. Ind. Co. Mus. 1851, p. 136.

¶ Schreber, Säugeth. Vol. (Supp.) 11, 1841, p. 22.

** Stoliczka, Journ. As. Soc. Beng., Vol. XLI, 1872, p. 223.

From the facts to be hereafter stated there can be no doubt but that these two species, *E. micropus* and *E. pictus* are perfectly distinct from each other, and from any other species of Indian hedgehog ever described.

It would also appear from what I have stated under *E. grayi*, that it is a well-defined species, and that it is probably the hedgehog which was figured by Gray from the Doab as *E. collaris*, but which was never described, and also that Dr. Jerdon was correct in regarding *E. spatangus* as the young of *E. grayi*, the latter term being the one that should be accepted for the species.

Dr. Gunther, to whom I am indebted for comparing the hedgehogs in the British Museum with certain specimens forwarded from the Indian Museum, informed me that the true relations of *E. mentalis* cannot be properly determined. I regret, however, that having mislaid Dr. Gunther's notes, I am unable to give the details of his comparisons.

I have personally examined the type of *E. nudiventris* which is a very young example of *E. micropus*.

Besides these three species, *E. micropus*, *E. pictus*, and *E. grayi*, the materials which have passed under my observation* have yielded two other apparently distinct species of hedgehog from Western India, and which I propose to name respectively *E. jerdoni*, and *E. blanfordi*, the distinctive characters of which are indicated hereafter. We have thus five species of hedgehog in India, three of which are forms which were unknown when Fitzinger† published his compilation on the *Erinaceidæ* in which he recognized *E. grayi*, *E. collaris*, *E. spatangus*, *E. mentalis*, *E. nudiventris* and *E. micropus*, referring them all to a trivial sub-genus *Hemiechinus*.

The hedgehogs of India are referable to two distinct groups, based on the characters of the dentition. *E. micropus* and *E. pictus* resemble each other in the following dental detail, wherein they differ from the other Indian hedgehogs, but whether any of the African forms are like them in this respect I am unable to say. The character I refer to is this, that the second upper premolar has a simple crown and only one fang, whereas *E. grayi*, *E. jerdoni*, *E. blanfordi*, *E. macracanthus*, *E. niger*,‡ *E. megalotis*, *E. auritus*, *E. albus*, and *E. europæus*, have the same tooth large with a compound crown and with 3 fangs. In both the species, the second upper premolar is very small and somewhat external to the line of the other teeth. In *E. pictus*, the tooth would appear to be generally present throughout life, and it is larger than in *E. micropus*, in which it seems to be generally lost at an early age. In hedgehogs with a compound second premolar, the tooth is

* I am specially indebted to Mr. W. T. Blanford for his having placed his fine series of Indian hedgehogs, preserved in alcohol, at my disposal for examination.

† Sitzsber. Ak. Wiss. Wien. LVI. 1867, pp. 844, 890.

‡ For description of this species see following pages (p. 212).

always in the line of the other teeth and always large and is never prematurely shed.

The first premolar also of the lower jaw is relatively smaller than in the species just enumerated, and it is smaller in *E. micropus* than in *E. pictus*.

There is a remarkable circumstance connected with *E. micropus*. In examining the different species of Indian hedgehogs, I was in the habit of having their skulls removed and cleaned for examination, and in having this done with *E. micropus* I was always disappointed on receiving back the skulls from the osteologist to find what I supposed was a broken zygomatic arch, owing to careless manipulation. The Museum osteologist, however, persisting in asserting that he was most careful in preparing the skulls, and that he had not injured them, I had a careful dissection made from without inwards on to the zygomatic arch, and I was astonished to find that there was no trace of a malar bone in any specimens of *E. micropus* examined by me, 4 in all. This fresh dissection showed that the interval between the zygomatic process of the squamous and the malar process of the maxillary is bridged over by tendon, and that therefore this South Indian hedgehog stands alone in this remarkable feature. Such a variation on the normal structure of the skull of a hedgehog was not to be anticipated, as there is no weakening of the zygomatic arch in any of the other species. Even in the allied species *E. pictus*, the malar is strongly developed. An examination of the free ends of the process of the maxillæ and squamous shews that this observation is perfectly accurate, as there is no indication whatever of any specialized surface on which a malar could rest, and which is always easily observable in skulls of other species in which the malar has been lost.

Notwithstanding this anomalous character, I am disposed to attach more weight to the character of the second upper premolar in this species than to the absence of its malar, which is an intense specific variation, whereas the other which is common to two species very closely allied in other details of their structure would seem to be almost entitled to sub-generic rank.

These two forms, *E. micropus* and *E. pictus*, notwithstanding the foregoing difference in the skulls, are externally so alike that they might be mistaken for one another. Not only is their coloration almost identical, but the form of their heads is much the same; and more important, their fore feet more especially differ essentially in shape from the fore feet of all the other Asiatic species of hedgehogs (see figs. *e* and *f*, Pl. III, and compare with fig. *f*, Pl. IV). Both of these species are characterized by their feet being short, club-shaped, and tubercular on the soles, whereas in such forms as *E. grayi* and the other Asiatic hedgehogs, the feet are not club-

shaped and tubercular, but moderately elongated with well-developed toes and generally long claws.

The feet of hedgehogs would appear to be the subject of considerable variation, as some have only 4 toes on the hind feet, (*Peröechinus* Fitzinger), and moreover the central pad of the hind feet would appear to be rudimentary in some species and to be present in others, while, as has just been shown, some of them have tubercular soles. It appears to me therefore that reliable specific characters are to be observed in the feet of the members of this genus, but I do not consider any of the variations to be of sub-generic value. As an illustration of the differences that subsist in this respect, it will be observed that the species *E. grayi* does not possess any true central pad on the hind foot, a structure which is largely developed in *E. jerdoni*, but nearly absent in *E. blanfordi*, which, as was to be expected from this circumstance, is closely allied to *E. grayi*.

Another feature in the structure of Indian hedgehogs is deserving of attention, and that is the presence on the vertex, in some species, of a considerable nude area quite devoid of spines, and even of the most rudimentary hairs. This naked area reaches forwards to where the spines arise on the forehead, dividing those on this region into two sets, one on either side of the head. It occurs in all the Indian species with the exception of *E. grayi* and *E. blanfordi*, and it is present also in *E. niger* and *E. macracanthus*, whereas it does not appear to exist in the European hedgehog and I have not observed it in any of the following species, viz., *E. auritus*, *E. albulus*, and *E. megalotis*, all of which, however, like the Indian species, whether with or without this area, agree in having fine soft almost silky hair, very distinct from the long bristly hair that clothes the body of the European species.

In the Zoology of Persia* a small hedgehog is figured along with the type of *E. macracanthus*. Both of the specimens which yielded the figures are now in the Indian Museum and the latter is distinguished (*E. macracanthus*.) by this nude area and black spines with two white rings, and the former, which Blanford considered as a young specimen of the species, by the entire absence of the bare area and by yellowish spines of which the tips are white, followed by a narrow black ring succeeded by a white and this again by a short brown space. This small hedgehog in the character of its spines and in the absence of the bare area on the vertex resembles *E. megalotis*, but it does not appear to be that species. I am disposed to conclude that this bare area is of too great structural importance to be present or absent among members of a species and to consider it as of specific significance. With regard to the disposition of the spines it would appear that

* Zool. of Persia, Blanford, 1876, Pl. 1.

their relative positions to each other depend greatly on the condition of the *papniculus carnosus*, and that the spines only become irregularly intermixed through contractions of this muscle which, when relaxed, permits the spines to lie flat and regularly.

On the label of an example of *E. albulus*, collected by Stoliczka, he has written, "outer edge of nostrils ciliated." On looking at the nostril in all the Indian species of hedgehog, I find that the outer edge, more especially the upper crescentic half, is provided with a papillary valve which serves to close the orifice. In *E. grayi*, it forms a distinct fringe of 12 papillæ.

The spines of the Indian and Western Asiatic hedgehogs are grooved and ridged, the ridges being covered with fine tubercles. The numbers of the ridges on the spines of the same animal are subject to considerable variation, and the degree to which the tubercles are developed appears to vary, so that stable specific characters are not yielded by these structures.

The foregoing characters, therefore, permit of the Indian hedgehogs being resolved into the following groups, and of the species being recognized by the characters under which they are grouped.

A. SECOND UPPER PREMOLAR SIMPLE, ONE-FANGED.

a. Feet club-shaped, soles tubercular.

I. A division or bare area on the vertex.

No malar bone: a prominent dark brown band through the eyes on to the neck. A white frontal band. Spines orange with apices white, succeeded by a narrow dark brown band.

Ears moderate. Fur below white, limbs brown, *E. micropus*.

A perfect malar bone: a brown band through the eyes and only very rarely prolonged on to the neck, stopping at the angle of the mouth. Spines broadly white at apex, succeeding brown band rather pale: no orange tint on spines. Ears round and not large, but larger than in the preceding species. Limbs pale brown, under-surface white, ... *E. pictus*.

B. SECOND UPPER PREMOLAR COMPOUND, THREE-FANGED.

b. Feet well developed and broad.

II. No division or bare area on the vertex.

No large mesial pad on the hind foot. Head elongated and muzzle long. Ears large, high and pointed. General colour dark brown, *E. grayi*.

Mesial pad on the hind foot very feeble. Head short, muzzle not elongated. Ears moderately large, not high and not pointed. General colour black above, fuliginous-brown below, *E. blanfordi*.



III. A division on the vertex, separating the spines into two groups. Hind foot with a large prominent mesial pad. Muzzle moderately long. Ears large, rounded at the tip and broad at the base. Spines long with 2 white and 3 black bands in the adult. General colour black above and below, ... *E. jerdoni*. The following is a description of these species in detail :

ERINACEUS MICROPUS. Plate V4.

Erinaceus auritus, Pearson, Journ. As. Soc. Bengal, Vol. V, 1836, p. 191.

Erinaceus collaris, Gray, List. Mam. B. M. 1843, p. 81, *partim*.

Erinaceus micropus, Blyth, Journal Asiatic Soc. Bengal, Vol. XV, 1846, p. 170, *partim* ; *id. op. cit.* Vol. XXII, 1853, p. 582 ; *id.* Cat. Mam. Mus. As. Soc. Bengal, 1863, p. 80 : Wagner, Schreber, Säugeth, Suppl. V, 1855, p. 591 ; Stoliczka, Journal Asiatic Soc. Bengal, Vol. XLI, 1872, p. 225.

Erinaceus nudiventris, Horsfield, Cat. Mam. East Ind. As. Mus., 1851, p. 136.

Erinaceus (Hemiechinus) micropus, Fitzinger, Sitzungbte. der K. Akad. Wissensch. Wien, Vol. LX, Pl. 1, 1867, p. 875, *partim*.

Head rather short, and broader than *E. pictus*, and slightly concave from the forehead to the tip of the snout. Ears moderately large and rounded at the tip, directed forwards and outwards, and slightly smaller than the ears of *E. pictus*. Feet well developed, but small, short and broad, with short toes and short claws: feet being somewhat larger than those of *E. pictus*. The first toe of the hind foot small, but claw strong. The soles of the hind feet more or less tubercular. When the muscle is not contracted over the forehead, the spines do not reach anterior to the front margin of the ears. There is a broad bare space passing backwards from the forehead for about one inch and a quarter, with a nearly uniform breadth of half an inch, and this bare area would appear to exist in both sexes of the species. The tail is short, and there is a semicircular bare area above it. The ears are moderately but sparingly clad with short whitish hairs, and the tail with longish dark brown hairs. The anterior third of the head, up to half way between the nose, the eye, and the chin appear to be nude, but they are very sparsely covered with minute white hairs. The middle third of the head is covered more profusely with longer hairs, and the posterior third, to between the ears, densely with moderately long hairs, increasing in length from before backwards. The upper surfaces of the feet are well clad with short flattened brown hairs. The bare surfaces on the head and above the tail are perfectly devoid of hairs. The under surface is not very thickly clad and the

insides of the limbs are still less so. The spines are rather fine, about 0·83 of an inch long, very sharp and marked with from 17 to 22 ridges and furrows, the former generally broader than the latter, and covered with minute shining tubercles. The apex of each spine is white and is succeeded by a narrow dark brown band which gives a brown and white speckled appearance to the animal. The remainder of each spine is yellow or orange yellow. The seminude skin of the anterior third of the head is leaden-coloured, a hue that extends on to the chin. The hairs on the second or middle third of the head form a broad brown band which embraces the eye, passes backwards behind the angle of the mouth, over the under surface of the neck as a dark brown collar. A brown spot at the upper angle of the ear. A broad white band behind the brown band and the spines of the forehead, passing downwards before the ears on to the sides of the neck and throat, behind the brown band, and continuous with the white of the under parts; chin and whiskers white, and sides of chin brownish. The lower halves of the limbs clad with brown hairs, also the tail. The inguinal region and lower abdomen clad with brown hairs with an intermixture of white.

The leading features of this species are its short snout and head, short club-shaped feet as compared with *E. grayi*, *E. blanfordi*, and *E. jerdoni*; its slightly longer feet as compared with *E. pictus*, which are, however, of the same type; its not long ears, slightly shorter than in the latter; its white and brown tipped spines, orange or yellow; and a brown collar over the forehead, between the eyes, behind the angle of the mouth and across the throat.

The skull is distinguished by its short broad character, but in this respect it is much narrower than the skull of *E. pictus*. In the former, the breadth across the zygomata falls short considerably of two thirds of the length, whereas in *E. pictus*, breadth and sharpness are marked features of the skull, combined with a greater post-orbital contraction than in *E. micropus*, and, in the adult male, the breadth generally equals two thirds of the length. The complete absence of the malar bone is another character which separates it from *E. pictus*, from which it is also distinguished by the small size of its 2 upper premolars.

The following are some measurements of *E. micropus*.

	♂	♂	♂
Length of body and head,	6' 65	6' 05	5' 90
" of tail,	0' 45	0' 53	0' 57
Height of ear,	1" 15	1" 05	1" 02
Breadth of ear,	0" 80	0" 78	0" 76
Snout to eye,	1" 00	0" 94	0" 94
Eye to ear,	0" 40	0" 31	0" 38
Length of hind foot without claw, ...	1" 15	1" 13	1" 15
Breadth at 5th toe,	0" 36	0" 40	0" 30

Blyth, in 1846,* in treating of the hedgehogs collected by Hutton near the Sutlej, pointed out that the third specimen described by Hutton,† with some doubt, under the name of *E. collaris*, Gray, was apparently distinct from that species. Blyth was disposed to regard it as identical with a hedgehog in the Asiatic Society's Museum, the locality of which he then stated was unknown, but which he afterwards considered‡ to have been received from the Nilgiris from Mr. Smoult and to be the specimen mentioned by Pearson as *E. auritus*. This latter specimen Blyth regarded as specifically identical with hedgehogs sent him from Southern India by Sir Walter Elliot, and with the hedgehog from Southern India in the British Museum grouped by Gray under *E. collaris*. He compared the skull of an adult specimen sent from Southern India by Sir Walter Elliot with the skull of Mr. Smoult's hedgehog and found them exactly to correspond, and these specimens he named *E. micropus*, the last mentioned being the type of the species. The skull, however, of Capt. Hutton's third specimen he goes on to remark "presents some differences; the general form is rather shorter and broader, it is more constricted between the orbits and the zygomæ are considerably more projecting; the small upper premolar anterior to the incisor teeth is less minute; and in the lower jaw, the second lateral pair of incisors from the front are much smaller, as indeed are also the next or last pair of the true incisors." From the description of this specimen which was obtained by Hutton§ in the neighbourhood of Shah Fârid on the left bank of the Sutlej, and from the details regarding the points wherein its skull differs from the skull of the Southern Indian hedgehog, I am disposed to consider, that Hutton's third specimen was an example of *E. pictus*. In 1853|| Blyth was still doubtful regarding the specific identity of Hutton's third specimen with *E. micropus*.

The next species, the cranial characters of which had been so well indicated by Blyth in 1846 and which entitle it to recognition, was described in 1872 by Stoliczka as *E. pictus*, but no reference was made to Blyth's observations, nor to the cranial and dental features of the animal. The characters selected by Dr. Stoliczka were exclusively external, and were derived from supposed differences existing between its spines and those of *E. micropus*, but after a very careful consideration of a large series of spines of both forms under the microscope, it appears to me that much importance cannot be attached to these structures as guides to species.

* Journ. As. Soc. Bengal, Vol. XV, p. 170; *op. cit.*, Vol. V, 1836, p. 191.

† *op. cit.*, Vol. XIV, p. 351.

‡ *op. cit.*, Vol. XXII, 1853, p. 582.

§ *op. cit.*, Vol. XIV, p. 351.

|| *op. cit.* Vol. XXII, 1853, p. 582.



Gray in his List of Mammalia* confounded this species with his *E. collaris*, = *E. grayi*.

E. micropus appears to be confined to Southern India, where it occurs in the low lying country and not on the mountains. Col. Beddome informs me that no hedgehog is found on the Nilgiris. The limits, however, of its northern and western distribution have yet to be ascertained.

ERINACEUS PICTUS. Plate III.

? *Erinaceus indicus*, Royle, Ill. Ind. Zool. 1839, p. 6, not described.

Erinaceus collaris? Hutton, Journ. Asiatic Soc. Bengal, Vol. XIV, 1845, p. 351, 3rd specimen, *partim*; Blyth, *l. c.* p. 352, foot note, *id. op. cit.*, Vol. XXII, 1853, p. 582, *partim*.

Erinaceus micropus, Blyth, Journ. Asiatic Soc. Vol. XV, 1846, p. 170, *partim*.

Erinaceus (Hemiechinus) micropus, Fitzinger, Sitzungsbe. der K. Akad. Wissensch. Wien, Vol. LVI, Pt. 1, 1867, p. 875, *partim*.

Erinaceus (Hemiechinus) pictus, Stoliczka, Journal Asiatic Soc. Bengal, Vol. XLI, 1872, p. 223.

Head (fig. *d*) the same as in *E. micropus*, but the ears (fig. *g*) somewhat larger, and the feet (*c* to *f*) narrower and not quite so long: the tail (fig. *h*) also is the same as in that species. The spines have the same characters as in *E. micropus*, but their tips are more broadly white and the brown bands below are not so dark. The result is that the latter are nearly obscured by the former. The remaining spines are pale yellowish, nearly white and not orange. There is no continuation of the brown band of the forehead lower than the angle of the mouth, except as a very rare circumstance, and in animals from the region of Central India, where the species probably meets the Southern *E. micropus*, but the colours in all other respects are alike. The dimensions of the species are these:

	♂	♂	♀	♀	♀
Length of head and body,	6" 70	6" 00	5" 85	5" 90	4" 73
„ „ tail,	0" 68	0" 68	0" 55	0" 53	0" 58
Height of ear,	1" 33	1" 23	1" 03	1" 21	0" 85
Breadth of ear,	0" 86	0" 88	0" 70	0" 81	0" 61
Snout to eye,	0" 88	0" 80	0" 88	0" 95	0" 73
Eye to ear,	0" 39	0" 35	0" 30	0" 30	0" 25
Length of hind foot without claw, ...	1" 10	1" 12	1" 10	1" 10	0" 95
Breadth across 5th toe,	0" 35	0" 30	0" 25	0" 35	0" 30

The skull (figs. *a* to *c*) is distinguished by its shortness and great zygomatic breadth, in which respects it differs from the skulls of all other Asia-

* List of Mamm. B. M., 1843, p. 81.

tic hedgehogs, and, as already stated, by its one-fanged simple second premolar placed out of the line of the teeth, and by the rather marked post-orbital contraction. The teeth are large and about the same size as in *E. micropus*, only the second premolar of the latter is excessively minute. The other characters wherein it differs from *E. micropus*, have been already indicated under that species.

As already remarked, this form was first described by Hutton as a probable variety of certain hedgehogs which he doubtfully regarded as *E. collaris*, which two of them appear to have been, but this third specimen, however, was undoubtedly *E. pictus*. *E. micropus* has diverged from the ordinary character of the genus more than any other Indian hedgehog, as is evinced by the absence of the malar, and in the excessively rudimentary character of its second premolar, and these modifications occurring in the most southern outlier of a Palearctic type are noteworthy.

A hedgehog obtained at Guna by Dr. A. Barclay would seem to indicate that the two species may possibly interbreed, as I have experienced some difficulty, judging by external characters only, in saying to which it should be properly referred. The coloration of its spines is more like that of *E. pictus*, than *E. micropus*, as the tips are broadly white, but, unlike any other example of *E. pictus* that has come under my observation, the brown band from the forehead is prolonged beyond the angle of the mouth across the throat. In all other respects, the coloration is alike to that of *E. micropus*. The ears also are somewhat larger than in *E. pictus*. The affinities, however, of this hedgehog as manifested by its teeth and the form of its skull are towards *E. pictus*.

Besides occurring at Guna, the most southern locality from which I have obtained it, I have received it also from Ulwar, from Major T. Cadell, V. C.; and the Indian Museum also came into the possession of a large number of specimens from Agra through Mr. A. E. Carlleyl. An example from Karachi has been received by exchange with the Municipal Museum, through the valued assistance of Mr. J. A. Murray. This latter specimen agrees with one in Mr. W. T. Blanford's possession from the same locality. He also possesses an adult male from Jeysulmere, the dimensions of which are given in the first column of the foregoing measurements.

It is probable that *E. indicus* was applied by Royle to the hedgehog which occurs about Delhi, and which appears to be this species.

ERINACEUS GRAYI. Plate IV.

Erinaceus collaris, Gray, Ill. Ind. Zool., Vol. I, 1872, Plate VIII, (not described): *id.* List. Mamm. B. M. 1843, p. 81, *partim*: Hutton, Jour. As. Soc. Bengal, Vol. XIV, 1845, p. 351, (first two specimens only);



Blyth, *op. cit.*, Vol. XV, 1846, p. 170 : *id. op. cit.*, Vol. XXII, 1853, p. 582, *partim* ; Wagner, Schreber, Säugeth. Suppl., Vol. V, 1856, p. 590 : Stoliczka, Journ. As. Soc., Vol. XLI, 1872, p. 225.

Erinaceus grayi, Bennett, Proc. Zool. Soc. 1832, p. 124 ; Gray List Mamm. B. M. 1843, p. 81 : Wagner, Schreber, Säugeth., Suppl. Vol. II, 1841, p. 28 ; *id. op. cit.*, Suppl. Vol. V, 1856, p. 590 ; Fitzinger, Sitzungsbt. der K. Akad. Wien, Vol. LVI, Pt. 1, 1867, p. 870, *partim* ; Stoliczka, Journ. As. Soc. Beng. Vol. XLI, 1842, p. 225.

Erinaceus spatangus, Bennett, Proc. Zoo. Soc. 1832, p. 124, *juv* ; Ogilby, Royle's Ill. Ind. Himal. Botany, 1839, p. 62 ; Blyth, Journ. As. Soc. Bengal, Vol. XV, 1846, p. 170 ; Gray, Mamm. B. M., 1843, p. 82 ; Wagner, Schreber, Säugeth., Suppl. Vol. II, 1841, p. 27 ; *id. op. cit.* Suppl. Vol. V, 1856, p. 590 ; Stoliczka, Journ. As. Soc. Bengal, Vol. XLI, 1872, p. 225.

Hemiechinus grayi, Fitzinger, Sitzungsbt. der K. Akad. Wien, Vol. LVI, Pt. 1, 1867, p. 870.

Hemiechinus collaris, Fitzinger, Sitzungsbt. der K. Akad. Wien, Vol. LVI, Pt. 1, 1867, p. 872.

Hemiechinus spatangus, Fitzinger, Sitzungsbt. der K. Akad. Wien, Vol. LVI, Pt. 1, 1867, p. 873,

Facial portion of head pointed and rather long (fig. *d*). Ears (fig. *g*) large, full, long and somewhat pointed. Feet (figs. *c* and *g*) large, the fore feet rather broad and somewhat truncated, with moderately long toes and powerful claws. The proximal palmar pads forming a pair, and not very prominent. The hind feet with the toes turned inwards, the fingers moderately long and with strong claws. The proximal pad of the sole internal to the first toe, and which is strongly developed as a large mesial pad in *E. jerdoni*, is practically absent in this species, so little is it developed.* The tail (fig. *h*) is moderately long and shortly haired ; no bare space on the vertex. The spines begin slightly behind the anterior margin of the ear, and they are generally about 0.75 long. The longitudinal grooves are numerous and shallow, but broader than the ridges which are 25 to 26 in number and studded with small tubercles. The spines are very narrowly tipped with black, and below this there is a very narrow yellowish band, succeeded by a broad dark-brown, almost black band, the remainder of each spine being yellow, except at its extreme base which is dusky. The broad dark-brown band below the yellow subapical band is so strongly developed, that when the animal is viewed from the side, with the spines directed outwards, it has a black appearance. There is, however, considerable variation in the intensity to which the yellow sub-apical band is developed, and some animals are

* The artist has not well represented this feature on the plate.

therefore much lighter coloured than others, as the brown band succeeding the latter is also much paler in some individuals than in others.

This species, besides the almost entire absence of the proximal mesial pad of the sole, is at once distinguished by the complete absence of the bare space that occurs in *E. pictus*, and *E. micropus*, among the spines of the vertex. From the two last named species which have no large proximal pad on the sole, it is recognised by its large feet, well developed toes, powerful claws, and by the turning in of the hind feet, as well as by its different coloration. There is a considerable naked space over the sacrum, and on the dorsum of the tail as in other species. The snout is seminude, being sparsely covered with very minute hairs. Behind the whiskers, the hairs become much more numerous and longer, and the area below the eye, and the forehead are well clad. The greater part of the front of the ear is nude, but there is a sprinkling of short white hairs internal to and along its margins. The chin and below the lower lips are almost naked, and, immediately behind the chin, the hairs are few. The under parts are well clad, but not densely so, and the limbs are thinly clad, more especially the feet on which the hairs are very few and short. The tail also is only sparsely clothed.

The general colour of the animal is blackish-brown or brown, the spinous portion of the body being darkest; but the colour is variable owing to the reasons already mentioned.

The front of the face from the nose backwards to the spines, the limbs and all the under parts with the exception of the chin and a line from it upwards to the ear which are white, are generally dark-brown or fuliginous-brown, blackish on the face, on which there is occasionally a considerable intermixture of white hairs. The hairs which clothe the ears, and a tuft of hairs at the base of the anterior margin of the ears, are white. The white on the chin is more prolonged upwards to the ears in some specimens than in others, giving rise to a kind of white collar which is much exaggerated in the figure of *E. collaris*. The claws are horny yellow.

The following are the measurements of this species:

	♂	♀	♀
Length of body and head,	6" 85	6" 70	6" 70
" of tail,	0" 96	1" 30	1" 02
Height of ear,	1" 45	1" 52	1" 38
Breadth of ear,	0" 97	0" 97	1" 00
Snout to eye,	1" 00	0" 49	0" 62
Eye to ear,	0" 52	0" 49	0" 62
Length of hind foot without claw,	1" 45	1" 45	1" 50
Breadth of hind foot,	0" 49	0" 45	0" 38

The skull of this species (figs. *a* to *b*) is distinguished from that of *E. pictus*, and the skull of *E. micropus*, by its large second premolar with three fangs, and from the other two species by its great zygomatic breadth. In this latter respect, it resembles *E. pictus*, but the skull has a considerably longer muzzle than in that species, and, as a whole, is not so broad and round. It is considerably broader than *E. blanfordi*, with more marked post-orbital contraction, and from *E. jerdoni* it is still more markedly separated by its relatively much greater breadth across the zygomatic, and more especially across the base of the muzzle, at the third premolar. The skull is undoubtedly most nearly allied to that of *E. blanfordi*, to which it presents a very close resemblance when the adolescent skull is compared with the adolescent skull of the type of that species. But the latter is narrower across the zygomæ, and has less post-orbital contraction, as already stated. It is further separated from the skull of *E. jerdoni* by its larger teeth, and by the different form of the canine. This tooth in *E. blanfordi*, as well as in this species, is less triangular and more sharply pointed than in *E. jerdoni*, *E. niger*, *E. pictus*, and *E. micropus*, and in this respect differs more in appearance from the first premolar than it does in these last-named species. All of these species are characterized by the presence of two sharp cusps to the canine section of the third premolar, while in *E. niger* described by Blanford, the posterior of these two cusps is entirely absent and its last molar presents only one eminence, while in all the others this tooth has two cusps the inner of which is always the larger.

The figure in the Illustrations of Indian Zoology was copied from one of General Hardwicke's drawings, and on the plate it is stated that the hedgehog was a species found in the Doab. There are many tracts of country in North-Western India named Doab, but General Hardwicke appears from his paper on *Mus giganteus*,* in using the term Doab, to have had in view the country lying between the Jumna and Ganges, in which the military Station of Fatehgarh is situated, and where he appears to have been stationed. There he had drawings made of the species of hedgehog which is there common, also of *Mus giganteus*, and of *M. (Nesokia) hardwickii* = *Arvicola indica*, Gray.

I am indebted to the late Mr. Andrew Anderson for many living examples of the hedgehog that occurs about Fatehgarh, and which appears to me to agree with the figure of *E. collaris*, from the Doab. As in the figure, the chin of these hedgehogs was more or less white, and, in some, the white extended up towards the ear as a kind of collar which, however, is exaggerated in the drawing of *E. collaris*, in which the contrast between the colours is too marked, and the animal altogether represented too dark. Notwithstand-

* Trans. Journ. Linn. Soc. Vol. VII, 1804, p. 308.

ing, I think there can be but little doubt, that the Fatehgarh hedgehog which is very common in the district is the *E. collaris*, Gray.

The specimens from Madras in the British Museum referred to this species are, as already mentioned, examples of *E. micropus*, Blyth.

This species has been also obtained at Ajmír in Rájputána by Mr. Blanford, and if I am correct in referring to it Hutton's two specimens, it extends west to the Sutlej. There Hutton obtained it in separate holes, "beneath a thorny bush called 'Jhund' in the desert tracts of shifting sand between Sundah Badairah and Hasilpoor," on the left bank of the Sutlej, and apparently in close proximity to *Erinaceus pictus*.

ERINACEUS BLANFORDI, n. s., Plate V.

Muzzle rather short (fig. *d*) and not much pointed; ears moderately large (fig. *g*), but broader than long and rounded at the tips, which are not acuminate as in *E. grayi*. The length of the anterior margin is equivalent to the breadth of the ear at its base. The feet (figs. *e* and *f*) are large and the hind foot resembles that of *E. grayi*, with the first toe well developed and there is the absence of any well developed median pad. The feet are also larger and broader than in *E. jerdoni*, and the first toe is more largely developed as in *E. grayi*. The claws are long and curved, especially those of the fore foot. The tail (fig. *h*) is short. The spines meet in a point on the forehead and do not reach quite so far forwards as the base of the upper border of the ear, and there is no bare patch in the midst of them, on the vertex. They are moderately long with 24 to 28 concentric ridges and furrows, the former finely tubercular. The general colour of the spiny portion of the animal is deep black, when the spines are looked at directly on end and when they are at rest, but when raised or seen sideways, the mesial yellow band becomes visible. The apex of each spine is broadly tipped with deep black, and this is succeeded by a very broad yellow mesial band, the base of each spine being dusky brown. The fur generally is deep brown and moderately long and soft. A few white hairs occur on the chin, and there is a tuft of white hairs at the anterior angle of the ear, and the latter anteriorly and posteriorly is sparsely covered with white hairs.

The skin of the back of the ear is blackish, also the margins of the ears anteriorly, but the centre of the ear is white. The claws are yellowish.

Measurements of *E. blanfordi*.

	♂
Length of body and head,	5" 36
" of tail,	0" 91
" of hind foot without claw,	1" 32
Height of ear,	1" 10

Breadth of ear,	0" 85
Nose to eye,	0" 72
Eye to ear,	0" 35

The skull (figs. *a* to *c*) of this species is distinguished from that of *E. grayi*, by its much less zygomatic breadth and by the less protuberant character of the supra post-orbital region. The teeth in both these species have much the same general characters. It is undoubtedly very closely allied to *E. grayi*, which it resembles in the absence of a bare area over the vertex, in its large feet with its hind toes somewhat turned inwards, and strong and long claws, and in the almost complete absence of a mesial pad on the hind foot, but it differs from it externally in its shorter muzzle, much shorter and more rounded ears, and in its darker coloration, and smaller size.

This species is known only from one specimen procured by Mr. W. T. Blanford at Rohri in Sind, where it is apparently associated with *E. jerdoni*, and I have named the species after its discoverer.

ERINACEUS JERDONI, n. s., Plate V⁴.

Muzzle moderately long and pointed. Ears large, rounded at the tips and broad at the base. Feet large, more especially the fore feet which are broad and powerful, with strong claws. The hind feet well developed, but proportionally not so large as the fore feet. A large well developed pad on the under aspect of the hind foot. Claws strong. The tail moderately long. The spines begin on a line with the anterior margins of the ear, divided on the vertex by a large nude area as in *E. micropus* and *E. pictus*. The spines are not very thick and they are marked generally with 19 grooves and 19 ridges, the latter exceeding the breadth of the former and being very sharp, with the tubercles passing down on their sides, almost into the hollow of the furrow. The animal is black when the spines lie flat, but when they are partially erected, the white bands show, and a variegated appearance is produced. In the adult with the spines 2"·15 in length, there are two white and three dark bands. The apical band is broad and deep shining black, and it is succeeded by a white band nearly of the same breadth, which is followed by a brown band with a white band below it, and then a dusky basal band. These are the characters of two females from Karachi, but in the younger of the two, the spines are 0"·97 in length and the basal band is hardly developed. In an adolescent male from Rájánpur, which I refer to this species, there is generally only one white central band to each spine, the apical and basal bands being black. In a few, however, measuring 0"·75 in length, there are two white and three apical bands as in the type, and it is probable that in this adolescent male as it reached maturity and its spines grew, the coloration of the

type would be attained. In a still younger female from Rohri, Sind, and for the privilege of examining which I am indebted to Mr. W. T. Blanford, the spines are fine and rather soft, and the majority of them do not exceed 0"·80, but yet they have only one white band prominently developed, although the basal white band is more or less indicated.

The hair generally is dusky brown, with an intermixture of grey hairs on the head and on the chin and throat, the fur behind the latter area and on the sides of the neck being paler brown than on the limbs and on the sides. A patch of white hairs occurs at the base of the anterior angle of the ear, and the inner surface of the ear is clad with short white hairs and the apical third of the back of the organ with similar hairs. The moustaches are brown and reach behind the ear. The claws are yellow.

Measurements of *E. jerdoni*.

	Adult.	Adolescent.
	♀	♂
Length of body and head,	7" 45	5' 85
„ of tail,	1" 25	0' 91
„ of hind foot without claw,	1" 48	1' 40
Height of ear,	1" 40	1" 35
Breadth of ear,	0" 76	0" 80

The skull of the female in its general characters is allied to the skull of *E. macracanthus*, Blanford, but is considerably less, with smaller teeth, the upper dental line of the latter measuring 1"·03 to 0"·97 in this species, which is a considerable difference in such small skulls. The skull also of *E. macracanthus* is characterised by a considerable concavity on the mesial line in the fronto-parietal area, which does not exist in this species. The skull has also a very strong resemblance to the skull of *E. niger*, but it is a relatively broader skull than the latter, which has an attenuated facial region, less post-orbital breadth and less temporal contraction, a smaller brain case, and only one internal cusp developed on the third premolar. It is distinguished from the skull of *E. blanfordi* by its more slightly elongated character, by its greater post-orbital breadth and swelling, by its relatively longer and less expanded zygomatic arch, more produced muzzle and by its teeth. It is markedly distinct from the short but especially broad skull of *E. grayi*, and it has much smaller teeth than that species.

The external features which appear to me to entitle this form to recognition as a species distinct from *E. blanfordi*, are the very prominent character of the mesial pad on the hind foot, its larger ears and the presence of a large nude area on the vertex, as in *E. micropus* and *E. pictus*, this latter character along with those already indicated separating it from *E. grayi*.

It resembles *E. niger*, in having a bare mesial area on the vertex, but is distinguished from that form by its smaller fore feet and smaller ear, and by its cranial characters as well.

There can be little doubt, however, but that *E. macracanthus*, and *E. jerdoni*, are very closely allied forms, but I believe that the characters I have indicated will be found persistent and reliable guides to enable them to be distinguished the one from the other.

This species occurs at Karachi, from whence I have received it from Mr. J. A. Murray, the Curator of the Karachi Museum, and from Rájampur from Dr. E. Sanders. Mr. Blanford has also obtained it at Rohri, in Sind.

DESCRIPTION OF PLATES.

Plate III. Details of structure of *Erinaceus pictus*, Stoliczka. *a.* upper view of skull: *b.* side view of skull: *c.* skull seen from below: *d.* side view of head: *e.* upper and under aspects of hind foot: *f.* fore foot seen from above and from below: *g.* side view of ear: *h.* side view of tail. All drawn natural size.

Plate IV. Details of structure of *Erinaceus grayi*, Bennett. *a.* upper view of skull: *b.* side view of skull: *c.* skull seen from below: *d.* side view of head: *e.* upper and under aspects of hind foot: *f.* fore foot seen from above and from below: *g.* side view of ear: *h.* side view of tail. All drawn natural size.

Plate V. Details of structure of *Erinaceus blanfordi*, n.s. *a.* upper view of skull: *b.* side view of skull: *c.* skull seen from below: *d.* side view of head: *e.* upper and under aspects of hind foot: *f.* fore foot seen from above and from below: *g.* side view of ear: *h.* side view of tail. All drawn natural size.

Plate V 4. Skull of *Erinaceus micropus*, Blyth. *a.* upper view: *b.* side view: *c.* skull seen from below: Natural size. *d.* teeth of upper and lower jaws enlarged 2 diameters.

Skull of *Erinaceus jerdoni*, n.s. *e.* upper view of skull: *f.* side view: *g.* skull seen from below: Natural size. *h.* teeth of upper and lower jaws enlarged 2 diameters.



XIX.—*Description of a supposed new Hedgehog from Muscat in Arabia.*—

By W. T. BLANFORD, F. R. S., &c.

(Received and read Dec. 4th 1878.)

(With Plate IX.)

Amongst a collection of small mammals, birds and reptiles, sent to me some time since by Colonel Miles, the Political Agent at Muscat, are two specimens, one preserved in spirit, the other a skin, of a species of hedgehog which appears to me undescribed. It is somewhat intermediate in characters between the Indian *E. collaris*, and the Persian and Baluchistan *E. macracanthus*, and *E. megalotis*, being larger than the former and having longer spines, whilst it is inferior in both respects to the two latter. The following is a description of the new form.

ERINACEUS NIGER, sp. nov.

E. supra niger, subtus nigrescenti-fuscus, auriculis longiusculis, pilis sparsis griseis indutis, aculeis longiusculis, apices versus nigris, in medio albis, ad basin fuscis. Long. tota 6—7, auriculi 1·6, plantæ 1·25 poll. angl.

HAB. Juxta Muscat in Arabia.

The description is chiefly taken from the specimen in spirit, a female. The size is moderate, exceeding that of *E. collaris*, but apparently inferior to *E. europæus*. The colour is black above, the white ring on the spines being very inconspicuous, the face is sooty black with a few gray hairs interspersed, the ears are grey. On the lower parts and limbs all the hairs are sooty or blackish brown.

The feet are of moderate size, not so broad as in *E. grayi*, nor short as in *E. micropus*, but resembling those of *E. collaris* in form, and thinly clad with hair above. Five claws on all feet, the inner claw on the hind feet much smaller than the others.

The ears are long, not very broad, rounded at the end, thinly clad outside and near the margin inside with short whitish hairs: there are longer white hairs at the base of the anterior inner margin, and longer blackish hair near the base in front and behind.

Spines long, one inch to one and a quarter in length on the hinder part of the back. In the spirit specimen, a female, none exceed 1·1 inches; in the dried skin some are nearly 1½ inches long. The spines commence on the forehead inside of each ear, leaving a space free from spines in the middle, running back for about an inch. All are black at the points for half an inch, then white for about ¼ inch, then dusky to near the base where they are

rather paler. Each spine is surrounded by about 24 to 28 longitudinal grooves, the ridges between the grooves being closely tuberculate.

The following are measurements of the specimen in spirit, an adult female. Males are probably rather larger. The length, owing to contraction, is somewhat less than that of a fresh specimen would be—

Length from nose to anus,	5.5
Ditto of tail,	0.9
<hr/>	
Total,	6.4
Length of ear from orifice,	1.6
Ditto ditto outside,	1.35
Breadth of ear,	0.9
Length of palma without claws,	0.9
Ditto planta ditto,	1.25

The skull of the same specimen is rather narrower than that of *E. colaris*, and has a longer muzzle. The following are measurements :

	in
Length from occipital plane to end of premaxillaries, ...	1.9
Ditto from lower margin of <i>foramen magnum</i> to ditto, ...	1.78
Ditto of bony palate from opening of posterior nares, ...	1.05
Breadth across zygomatic arches,	0.98
Breadth of frontal region between orbits,	0.45
Ditto nasal bones,	0.13
Length of nasal suture,	0.56
Ditto of mandible,	1.42
Height of ditto about,	0.65

Description of Plate.

- Fig. 1. Head of *Erinaceus niger*.
 2. Fore foot of ditto.
 3. Hind foot of ditto.
 4, 5, 6. Skull of ditto.





XX.—On *Arvicola indica*, Gray, and its relations to the Sub-Genus *Nesokia*, with a description of the species of *Nesokia*.—By J. ANDERSON, M. D., Superintendent of the Indian Museum, and Professor of Comparative Anatomy, Medical College.

(Read 4th Dec. 1878.)

(With Plates XIII and XIV.)

In Gray and Hardwicke's Illustrations of Indian Zoology there is a representation of a rodent,* "The Indian Field-Mouse," *Arvicola indica*, Gray, bearing the date 1st May, 1829. This drawing is unaccompanied by any information regarding the locality from whence the animal was obtained. It represents a rat with a short bluff head; with moderately-sized, semi-nude ears; sparsely clad feet with rather long claws, and a naked tail shorter than the length of the body and head. The eye is figured large. The general colour is a pale sandy brown, with interspersed longer hairs.

In the Proceedings of the Zoological Society for 1835, p. 108, it is recorded that Dr. Gray on exhibiting some rats and mice collected by Mr., now Sir Walter, Elliot, in the Southern Mahratta country, took occasion to point out that the so-called *Arvicola indica* was really a true *Mus*. In 1837† Dr. Gray in referring to the Genus *Mus*, as understood by him, stated that "the *Mus giganteus*, Hardwicke, may be regarded as the type, to which may be added the two following new Indian species which have the tail shorter than the body and the fur with scattered bristles," and these species were *Mus rufescens*, Gray, (House-rat), and *Mus kok*. The latter he considered to be identical with *Arvicola indica*. Dr. Gray, holding this view regarding the identity of the animal figured in the Ill. Ind. Zool. with that of the rat sent by Elliot from Madras, under the Canarese name of *Kok*, re-named it, adopting the native name, *kok*, for the species. The *Mus kok*, afterwards described by Elliot as *Mus providens*, appears to me, however, to be distinct from the animal originally figured as *A. indica*.

In the same contribution, Dr. Gray described a rodent with "the cutting teeth, large, smooth, yellow and flat in front" under the name of *Mus hardwickii*. He compared it to *Mus kok*, that is, to the Madras rat which, he stated, it very much resembled, "but the skull is much wider and stronger and rather larger, and the cutting teeth are nearly twice as wide and are flat in front. The grinders are very little larger than those of that species."

* Vol. I, Plate XI, Mamm. 1832.

† Mag. Nat. Hist. (Charlesworth) Vol. I, 1837, p. 586.

In 1842,* Dr. Gray, selecting *Mus hardwickii* as his type, described the genus *Nesokia*, characterizing it thus, "cutting teeth very large, flat in front and smooth; grinders 3:3; front upper large with three cross ridges; the middle oblong, and the hinder much narrowed behind, each with two cross ridges; the front lower grinder larger, narrowed in front with three cross ridges; hinder each with two ridges, the hindermost smallest, rather narrowed behind: tail short, thick, with whorls of scales and scattered bristles: toes 4—5, moderate, the three middle sub-equal, long, the outer moderate: claws small, compressed: front thumb tubercular, with a rudimentary claw: ears moderate, naked." "This genus," Dr. Gray states, "is easily known from the rats (*Mus*) by the large size of the cutting teeth and the shortness of the tail: it appears," he continues, "to be intermediate between the Rats and *Rhizomys*."

In 1839,† Sir Walter Elliot described the afore-mentioned rat from Southern India under the name of *Mus (Neotoma) providens*, identifying it with the *Mus indicus*, Geoff. and the *Arvicola indica*, Gray, mentioning its Canarese name *Kok* or *Koku*, but his identification of it with *M. indicus* Geoff. was erroneous, as *Mus providens* is undoubtedly a *Nesokia*. Prof. A. Milne-Edwards, who has kindly examined for me the type specimen of *M. indicus*, Geoff. in the Paris Museum, informs me that it is very nearly allied to *Mus decumanus*, and that, although it is a little smaller, its teeth have the same conformation; and he further observes that *Mus indicus* is perfectly different from the animal figured by Peters under the name of *Spalacomys indicus*. *Mus providens*, however, has a skull like that of *S. indicus*, as I have satisfied myself by the examination of the skulls of two of Sir Walter Elliot's specimens.

Sir W. Elliot, in considering *Mus providens* as identical with *Arvicola indica*, Gray, lends the weight of his authority to the view that I have been led to adopt regarding *Arvicola indica*, because there can be no doubt that they both belong to one sub-generic type of *Mus*.

On referring to the list of Mammalia in the British Museum, published in 1848, three specimens of a rat are mentioned under the name of *Mus kok*‡ from Madras, and presented to the British Museum by Sir W. Elliot, and in the Introduction to his List of Mammalia§ 1843, Dr. Gray states that the *Mus kok* and some other species of rats (*Mus rufescens*, &c.) described in the Magazine|| of Natural History, 1837, were founded on specimens sent by Sir Walter Elliot, and that they were au-

* Ann. and Mag. Nat. Hist., Vol. X, 1842, p. 264.

† Madr. Journ. Lit. and Sc., Vol. X, 1839, p. 209.

‡ l. c., p. 110.

§ Op. cit., 1843, p. vii.

|| l. c.

thentic specimens of the species described by Elliot in the Madras Journal of Literature and Science.* There can therefore be no doubt of the identity of *Mus kok* with *Mus providens*, and that the types, as stated in the 'List of Mammalia,' on the authority of Elliot, were from cultivated plains in the Madras Presidency, and from Madras itself. The figure of *Arvicola indica*, fortunately bearing the date, 1st May 1829, renders it impossible that any of Elliot's specimens could have contributed the type of that species, and, moreover, in the Proceedings of the Zoological Society of 1835, it is stated that it was figured from General Hardwicke's drawings.

In the 'List of Mammalia,' there is no specimen under *M. kok*, of which *Arvicola indica* was regarded by Dr. Gray as a synonym, that could have formed the type of the latter, as all the specimens of *M. kok* that have been mentioned were, with one exception, received from Sir W. Elliot. The exception is described as (c) "a small rat with a very long tail: India: from Dr. Smut's Collection." A very long tail would seem to be sufficient evidence that this was neither *M. kok* nor *Arvicola indica*. On again turning to the 'List of Mammalia,' we find that the type of *Nesokia hardwickii* was presented by General Hardwicke, and in connection with this it is noteworthy that animals from the North-West Provinces of India corresponding to the description of that species are remarkably like the drawing of *Arvicola indica*. Moreover, Blyth states that there is no rat in Bengal, nor apparently in Madras, corresponding to that figure, and by extensive research, I can confirm this statement.

In the Catalogue of the Specimens and Drawings of Mammalia and Birds of Nepal and Tibet, presented by B. H. Hodgson to the British Museum (1846), the *Kok*, *M. providens*, is assigned to *Nesokia*, a course which Blyth himself followed in his Memoir on the Rats and Mice of India and in his Catalogue of Mammals.

In 1842, Sir Walter Elliot presented two stuffed specimens of *Mus providens* = *M. kok*, Gray, to the Museum of the Asiatic Society of Bengal and these specimens still exist in the Indian Museum. They apparently belong to the variety found in the red soil, and which Elliot says is much redder than the common *Koku* of the black land, and they are quite distinct from *M. (N.) hardwickii*.

On a review of these circumstances, I am disposed to make the suggestion that the rat figured as *Arvicola indica*, and which Gray considered to be the *Mus indicus* of Geoffroy, is in reality the rat described by him, first under the name of *Mus hardwickii*, and afterwards as *Nesokia hardwickii*; and in connection with this view of the question, it is important to bear in mind that the figure of *Arvicola indica* was received from

General Hardwicke who afterwards, in presenting to the British Museum the type of Gray's *Mus (Nesokia) hardwickii*, presented a rat agreeing with the figure of *Arvicola indica*. The type of *Mus indicus* with which Gray believed his *Arvicola indica* to be specifically identical was from Pondicherry, and as has already been stated, it is a true rat allied to *M. decumanus*, and perfectly distinct from the animal figured under the name of *A. indica*, but, moreover, no rat has been obtained at Pondicherry at all corresponding specifically to the *Mus (Nesokia) hardwickii* with which the figure of *Arvicola indica* agrees.

The specimens of *Mus providens* in the Calcutta Museum are distinguished from *Mus (Nesokia) hardwickii* by their much narrower incisors, smaller molars, and by a long but narrow anterior palatine foramen, an opening which is very short in *Mus (Nesokia) hardwickii*, as is seen in Peters' characteristic figure of the so-called *Spalacomys indicus*,* but the form of the skull is the same, both differing in the same respects from *Mus*. I have had the Madras rat alive† and have observed that it has the deep and rather short muzzle of *Nesokia*, with incisors broader than those of ordinary rats, and with the molars, when worn down, having the general characters of *Nesokia*. These rats, coming as they do from Southern India, agree externally with the types of *M. providens*, and have similar short *Nesokian* skulls.

In Lower Bengal, there is a burrowing rat, a great pest in gardens, in which it constructs numerous tortuous passages, some comparatively superficial, and others at times very deep, and throws up heaps resembling mole hills. It is closely allied to *Mus providens*, but differs from it in its somewhat greater size, and in other slight details, afterwards to be noticed. This is the rat which Blyth incorrectly identified with *Mus indicus*, Geoff., and with which he also wrongly identified *Arvicola indica*, *Mus huttoni*, Blyth, *M. rattoides*, Hodgson, *Mus pectoris*, Hodgson, and *Mus dubius*, Kelaart, but which is perfectly distinct from *Mus (Nesokia) hardwickii* which also differs from *M. huttoni*. It appears probable that this is the rat also figured in the Ill. Ind. Zool. Vol. II, pl. 21, under the name of *Arvicola bengalensis*, but which was never described. This being the case, the Bengal form must be named, whilst *Mus (N.) hardwickii* will stand for the rat originally described as *Arvicola indica*, and afterwards as *Nesokia hardwickii*; the original of the figure of *A. indica* being probably the type itself of *Mus hardwickii*, whereas *M. (N.) providens* will stand for the Southern form first described by Gray under the barbarous name of *M. kok*. In the Indian Museum, there are many rats in alcohol from Fateh-

* Abhand. der K. Akad. Wissensch. zu Berlin, 1840, p. 143, Taf. II, fig. 1.

† I may take the opportunity to record here that males and females of this rat escaped from confinement in the Calcutta Museum.

garh, presented by the late Mr. Andrew Anderson, which yield skulls the exact counterpart of the skull figured by Peters as *Spalacomys indicus*, and these rats agree with the figure of *A. indica*, and with the description of *Nesokia hardwickii*. Hodgson described, in 1846, a rat from Nepal which he called *Mus hydrophilus** and which Gray first regarded as an *Arvicola*, and afterwards as a *Nesokia*. He described it as characterised by its small ears, hardly above one-third the length of the head, also by its short tail "and by its fine and short pelage: the head he described as larger and the muzzle thicker than in the common land rats; 'above dusky brown; below and the limbs nearly white. Long piles inconspicuous. Snout to vent $3\frac{1}{2}$ inches; tail $2\frac{1}{4}$; head $1\frac{1}{4}$; ears $\frac{2}{5}$; palm $\frac{1}{2}$; planta $\frac{1}{3}$.' These characters would seem to indicate a rat allied to the so-called *Nesokia* or *Spalacomys*, Peters, but I hesitate to pronounce any decided opinion on the species. In connection with the name of *hydrophilus* given by Hodgson to this rat, I have observed that the common *Nesokia* of Lower Bengal, which I propose to name *Mus (N.) blythianus* after Blyth, who did so much to forward the progress of Natural History in India and to enlarge our knowledge of this group, manifests a remarkable capacity, for a rat of its type, to take to water, when hard-pressed. Its burrows are frequently constructed on the banks of tanks in Lower Bengal, and when the rats are being dug out, they will freely take to the water, if that is their only way of escape, and swim considerable distances. To test this aquatic power, I had two rats placed in a large wire bird-cage, and the cage partially submerged. If the rats, when in those circumstances, were much annoyed, they immediately dived to the bottom of the cage, where they could be observed running about under water. I also had them removed from the cage, and let loose in the large sheet of water in the Zoological Gardens, between the two iron bridges. When let loose at the bank, and an attempt was made to catch them, they immediately dived, and the stronger of the two did not appear at the surface for some time, when it was observed at a considerable distance from the bank, making for the opposite side.

I have already referred to the name given by Elliot to the allied form from Madras, viz., *M. providens*. He records of it that it stores up large quantities of grain during harvest. The natives of Bengal ascribe a similar habit to *M. (N.) blythianus*, and it has been stated to me that sometimes considerable quantities of grain may be found in a burrow, and that the natives being aware of this habit make raids on these murine granaries.

With reference to the characters of the genus *Nesokia*, Gray, the examination of a large series of skulls of *M. hardwickii* and of the other species shows that the dental features selected by Gray are essentially

* Ann. and Mag. Nat. Hist. Vol. XV, 1845, p. 267; Cat. Sp. and Draw. Mamm. &c. Hodgson, Nepal, Coll. Brit. Museum, 1846, p. 19; l. c. 1863, new ed., p. 10.

those of worn teeth, and that they do not contain the characters of the dentition as seen in the teeth before they are worn. In the latter condition, each of the three laminae of the first upper molar presents a large central cusp, and a much smaller or even minute cusp on either of its sides, resulting as it were from the sinuous characters of each lamina of the tooth. In true mice and ordinary rats, the laminae are transversely more sinuous and smaller, whereas in *Nesokia* they are large and transverse without any marked sinuosity, in the more typical forms. In the second upper molar, there are only two laminae, the first being abortive and only represented by a small isolated cusp attached to the anterior face of the inner cusp or fold of the first of the two laminae, which is exactly the same arrangement as in *Mus*. The last molar, except in having its laminae more regularly transverse than in *Mus*, resembles the same tooth in this latter genus. In the lower jaw, there is the same regularly transverse character in the larger laminae as compared with *Mus*, but all the cusps are the same. In the large rats of the type of *M. giganteus*, Hardwicke, the teeth conform more to the type characteristic of the ordinary rats and mice, the laminae, however, being relatively larger than in *Mus* and less sinuous, but taking the dentition as a whole, in connection with the form of the skull, these large rats are more closely allied to *Nesokia* than to the true rats, an opinion which was first held by Sir Walter Elliot.*

The incisor teeth of a *Nesokia* are always broader than those of an ordinary rat, and in this respect are more chisel-shaped, but the incisor teeth of the large rats such as *M. giganteus* are also proportionally broader than those of ordinary rats.

In the adult animal, such as that figured by Prof. Peters, the laminae are very regularly transversely oblong without any trace of such cusps as those I have described; and in old individuals of the larger rats, such as *M. giganteus*, the teeth I have observed to be worn down, much in the same way as in the so-called *Nesokia* = *Spalacomys*. Considering these facts, it does not appear that the genus *Nesokia* has any ground to recognition on characters derived from the dentition. The points in which the skulls of rats referable to the type of *M. (Nesokia) hardwickii*, Gray, (*Spalacomys indica*, Peters,) differ from those of the ordinary rats and mice are, on the other hand, much more pronounced than any difference in their dentition. The skull of *Nesokia* is a much broader and shorter skull with a short stout muzzle and expanded zygomata. The brain case is much shorter and broader than that of any member of the genus *Mus*. The temporo-parietal ridges also are proportionally nearer each other than in *Mus*, and the upper surface of the parietals is more flattened. The anterior palatine foramina are much

* Madr. Journ. Lit. and Sc., Vol. X, p. 209. Sir W. Elliot erroneously regarded *M. providens* and *M. giganteus* as belonging to the genus *Neotoma*.

more closed than in ordinary rats and mice, and in some of the more typical *Nesokia*, such as *M. (N.) hardwickii*, they are almost closed. There is also this further difference, that the palate of *Mus-Nesokia* contracts more anteriorly than in *Mus*, and is always proportionally narrower, with a much shorter edentulous interspace behind the last molar than in *Mus*. In the larger rats, such as *M. giganteus*, the posterior portion of the palate, in this respect, corresponds to *Mus-Nesokia*, and the features of the palate generally are more *Mus-Nesokian*, than those of true *Mus*. The palate also of *Mus-Nesokia* is marked by two somewhat pronounced longitudinal furrows which are the backward prolongations of the anterior palatine foramina. These grooves, near their hinder extremities, have the posterior palatine foramina lying in their course, and beyond them they are prolonged over the posterior margin of the palatines where they nearly constitute a closed canal by the inward projection of the inner palatine border of the maxilla and the somewhat thickened and anteriorly recurved posterior margin of the palatines. This arrangement is seen to occur only in a very feeble degree in ordinary rats and mice which, however, have not, as a rule, any thickening of the hinder margin of the palatines. Like the majority of thoroughly burrowing rodents, the tympanics are relatively much larger than in the ordinary rats. The large rats (*M. giganteus*) have the palatine features and the tympanics of *Mus-Nesokia*. These giant rats have rather more elongated skulls than the more typical *Nesokians* and, in this respect, they serve to connect the latter with the generality of mice and rats, but in their other features they more resemble *Mus-Nesokia* than *Mus*. I would therefore regard them as constituting a section of the sub-genus *Nesokia*. This view was first put forward by Sir Walter Elliot, so long ago as 1839, and Blyth agreed with him in regarding the affinities manifested by the great bandicoot rats as thoroughly *Nesokian*, and in the propriety of separating all of these *Nesokian* species from the typical forms of mice.

After a careful consideration of the characters which these various species display, it appears that this sub-genus of *Mus* may be conveniently divided into three sections; 1st, one section containing such forms as *Mus (Nesokia) hardwickii*, *M. (N.) huttoni*, *M. (N.) scullyi*, the more typical species of *Nesokia*, all characterised by broad incisors regularly laminated, large molars and small anterior palatine foramina, with tails considerably shorter than the body; and the females possessing only 4 pairs of mammary teats, two inguinal, one axillary and one pectoral: 2nd, another section comprising *M. (N.) providens*, *M. (N.) blythianus* (n. s.) and *M. (N.) barclayanus* (n. s.), distinguished by somewhat narrower incisors, smaller and less regularly transversely laminated molars, more open anterior palatine foramina and longer tails; with the females possessing as many as even 7 to 9 pairs of

mammary teats*: and, lastly, a third division containing *M. (N.) giganteus* and *M. (N.) elliotanus*, (*n.s.*) the so-called bandicoot rats, with longer skulls, broad incisors, with molars of the type of the second section, but proportionally somewhat larger with less wavy laminae, longer anterior palatine foramina and tails nearly equalling the length of the body and head. I have largely collected rats for the Indian Museum from all parts of India, and out of the materials brought together I am enabled to determine the following species belonging to the sub-genus *Nesokia*.

1st Section.

MUS. (NESOKIA) HARDWICKII, Gray.

? *Arvicola indica*, Gray, Gray and Hardw., Ill. Ind. Zool., Vol. I, 1832, Pl. XI.

Mus. hardwickii, Gray, Mag. Nat. Hist. (Charlesworth), Vol. 1, 1837, p. 585.

Nesokia hardwickii, Gray, Ann. and Mag. Nat. Hist., Vol. X, 1842, p. 265, List Mamm. of 1843, p. 113; Jerdon, Mamm. Ind. 1867, p. 190.

? *Mus hydrophilus*, Hodgson, Ann. and Mag. Nat. Hist., Vol. XV, 1843, p. 267.

? *Mus pycoris*, Hodgson, Ann. and Mag. Nat. Hist., Vol. XV, 1845, p. 267.

Nesokia griffithii, Horsfd., Cat. Mamm. East Ind. As. Mus., 1851, p. 145.

Spalacomys indica, Peters, Abhand. der K. Akad. Wissensch. zu Berlin, 1860, p. 143, Taf. IV, fig. 1.

The head short and bluff, much shorter and broader than in *M. (N.) providens* and *M. (N.) blythianus*; the muzzle broad and deep, and in these respects it resembles (*N.*) *huttoni*. The eye moderately large and situated about half way between the ear and the end of the muzzle. Ears not large, smaller than in these other two species, rounded, seminude, but clad with minute hairs. Tail variable, but much shorter than in *M. (N.) providens*, and *M. (N.) blythianus*, seldom exceeding the distance between the vent and the middle of the neck, but shorter than in *M. (N.) huttoni*: ringed, nearly nude, less clad than in *M. (N.) providens* and *M. (N.) blythianus*, with minute hairs. Feet well developed, smaller than in *M. (N.) huttoni*; claws moderately long; the upper surface of the feet sparsely clad.

The fur is generally soft and moderately long, but not so silky as *M. (N.) huttoni*: it varies however in this respect and is sometimes somewhat

* Hodgson described a rat, as *M. plurimammis* from Nepal and the Terai, which, from the description and the proportional length of its tail appears to be an allied species.



harsh. The pelage, as in the other species, consists of three kinds of hairs, short under-lying fur, and ordinary hairs, intermixed among which, especially on the dorsal and sacral regions, are numerous long black hairs which project a long way beyond the fur, as in *M. (N.) blythianus*,* but not to the same extent. The general colour of the animal on the upper parts is sandy brown or fawn, paler on the sides, and dusky grey with a tinge of yellowish rufous on the under-surface. The muzzle, feet and tail are flesh-coloured, and the ears are of the same colour but somewhat darker.

Mr. Blanford† has pointed out that *M. (N.) hardwickii* is a much larger animal than *M. (N.) huttoni*. The measurements of the largest male, *M. (N.) huttoni*, mentioned by him are as follows, taken from the fresh animal, viz. :—

Length of body and head,.....	7"
Length of tail,	4"·6
Length of hind foot,	1"·6

whereas the largest male, out of an extensive series of this rat in alcohol, collected by the late Mr. Andrew Anderson at Fatehgarh, gives the following dimensions :

Length of body and head,	7"·85
„ of tail,.....	4"·60
„ of hind foot,	1"·27

Besides differing in size these species would appear also to differ in the relative proportions of the tail and the feet, the latter being somewhat larger in *M. (N.) huttoni*, than in *M. (N.) hardwickii*. The *M. (N.) griffithi* of Horsfield in its proportion agrees with this species. If two female examples of the two species from the same localities are compared, we have similar results, thus—

	<i>M. (N.) huttoni.</i>	<i>M. (N.) hardwickii.</i>
	♀	♀
Length of body and head,	6·50	6"·45
„ of tail,	4·55	4"·15
„ of hind foot,	1·43	1"·25

I am indebted to Dr. Dobson for having compared the foregoing male specimen from Fatehgarh with the type in the British Museum, with which he pronounces it to agree.

The skulls, however, are remarkably alike and the only differences I can detect are, that the molar teeth of animals by their other characters referable to *M. (N.) huttoni*, are somewhat larger than those of *M. (N.) hardwickii*, the anterior palatine foramina of the latter being a little shorter

* These piles are not shown in the figure of the species in the Zoology of Persia.

† Zool. of Persia, p. 59.

than that of the former, but in both they are much closed and their characters are well shewn in the female skull of this species figured by Prof. Peters. This foramen, however, is subject to a slight variation in the degree to which it is closed. The skulls of both species agree in having an expanded surface to the malar process of the maxillary.

Mr. Andrew Anderson forwarded to the Indian Museum from Fatehgarh specimens agreeing with the example that has been compared with the type of the species and which also conforms to Hodgson's description of *Mus. pyctoris*, the type of which, however, Dr. Dobson informs me, he has not been able to find either in the British Museum or in the India Museum.

This species in the proportion of its tail, in the colour of its pelage, in the flesh-coloured character of its several parts, such as its feet and tail, and in the form of its head so closely approaches the figure of the animal depicted as *Arvicola indica*, that I hesitate only with a meagre doubt to regard it as identical with the animal figured under that name. The only dubiety I have in expressing this opinion arises from the affinity that exists between *M. (N.) hardwickii*, and the burrowing rodent described by Blyth as *M. (N.) huttoni*.

This species is very prevalent about Fatehgarh in the North-Western Provinces of India, and if *M. griffithi* is correctly identified with it, the species would appear to extend into Afghanistan, to the district about Quettah.

MUS (NESOKIA) HUTTONI.

Mus huttoni, Blyth, Jour. As. Soc. Beng., Vol. XV., 1846, p. 139.

Nesokia indica, Blyth, Jour. As. Soc. Bengal, Vol. XXXII, 1863, p. 328, *partim*: *id.* Cat. Mamm. As. Soc. Mus., 1863, p. 112, *partim*.

Nesokia huttoni, Blanford, Zool. of Persia, 1876, p. 59, P. VI, fig. 1, et cranium, figs. 1 and 2, p. 60.

Head and general form of the animal the same as in *M. (N.) hardwickii*, but with larger feet and a somewhat longer tail. Fur also as in that species, but more soft and silky and paler fawn-coloured, the under parts being pale hoary, sometimes tinged with yellowish and ferruginous. The ears are round and about the same dimensions as in *M. (N.) hardwickii*, and very sparsely clad with minute hairs. The feet sparsely covered with short whitish hairs and the tail also almost nude. The nose and feet are flesh-coloured, but the tail and ears are darker and brownish.

	♂	♀
Length of body and head,*	7"	6".7
" of tail,	4".6	4".9
" of hind feet,	1".6	1".5

* These measurements are taken from Mr. Blanford's "Persia," and are those of fresh specimens.



The general characters of the skull I have already indicated under *M. (N.) hardwickii*.

Mr. Blanford states that this field-rat has only 3 pairs of mammæ, but in a female collected by him at Kalagán, Balúchistán, I observe that it has the same number of mammæ as the female of *M. (N.) hardwickii*, viz., 8, two inguinal pairs, one axillary pair, and one pectoral pair as in that species. Mr. Blanford probably overlooked the axillary mammæ which occur also in *M. (N.) providens*, and *M. (N.) blythianus*, and in the ordinary rats, such as *M. decumanus*.

The Indian Museum has received this species from Umballa, where it was obtained by the late Lieut.-Col. Tytler; from Kalagán in Balúchistán from Mr. Blanford, who has also presented examples from Sháhbandar and Khipra, Sind; and from Karachi examples have been received from Mr. J. A. Murray of the Municipal Museum of that town.

Examples have also been quite recently sent to the Indian Museum from Dakka, Afghanistan, by that observant naturalist Dr. Arthur Barclay. He states "that this species occurs in large numbers all about that Fort, which is at a low elevation, being only a little above Peshawar. The soil is loose and very fine, almost like exceedingly fine sand. The holes of this rat do not run deep but ramify horizontally, just below the surface of the ground. It throws out a mound of earth at the exit of the hole. I have never seen these rats out of their dens during the day, but frequently during my evening walk I have watched them throwing out earth. The mouth of the hole is usually kept shut up with earth."

M. (NESOKIA) SCULLYI.

Nesokia scullyi, J. Wood-Mason, Proc. As. Soc. Beng., 1876, p. 80.

Form of body and head the same as in *M. (N.) hardwickii*, but distinguished from it and from *M. (N.) huttoni*, to both of which it is closely allied, by its much larger feet, the hinder pair of which in an animal with the body and head 6"·6 long, the hind foot and claws measure 1"·72, whereas in *M. (N.) hardwickii* and *M. (N.) huttoni*, in animals of the same dimension the feet measure respectively 1"·26 and 1"·43. The tail is longer than in *M. (N.) hardwickii*, and in its proportions it more resembles the tail of *M. (N.) huttoni*. The fur also is longer and more silky than the fur of the two foregoing species, but in this respect it is approached by *M. (N.) huttoni*. The tail is stated by Mr. Wood-Mason to be without a single hair, but in the type I observe that it is very sparsely covered with hairs, to the tip. The feet are clad with short brown hairs, but to a less extent than in any of the other species.

The fur is a slightly paler fawn than that of *M. (N.) huttoni*, the long piles being white tipped. The sides are still paler, and the under surface is

a pale grey, tinged with yellowish. The whiskers are black, tipped with white. The ears are short, scarcely appearing above the fur, and they are almost nude, but sparsely clad as in the other species. The feet and claws flesh-coloured.

The skull has a broader muzzle than the skull of *M. (N.) huttoni*, than which it is somewhat larger, exceeding also the size of the skull of *M. (N.) hardwickii*. It also differs from the skull of *M. (N.) huttoni*, in its greater supraorbital breadth and less expanded zygomatic. It has the expanded malar process of the maxillary as in *M. (N.) hardwickii* and *M. (N.) huttoni*, but to less extent than in the latter species, than which the lachrymal foramen is much smaller. Its molar teeth are also larger than in *M. (N.) huttoni*, and its anterior palatine foramina are more open. Dr. Scully gives the dimensions as follows: total length 11"·8, tail 5"·2, and the weight as 5·6 oz. The irides he states are dark brown.

This species was obtained by Dr. Scully at Sanju in Kasbgaria and presented by him to the Indian Museum.

The Indian Museum has received from Muscat, Arabia, a young rat belonging to this sub-genus, of the following dimensions. Length of body and head 3"·35, tail 2"·30, hind foot 0"·93. Its ears are small and rounded, its tail is rather densely clad with short hairs. It is too young to indicate its species, but it is quite distinct from any of the field rats described in this article.

2nd Section.

MUS (NESOKIA) PROVIDENS.

Mus kok, Gray, Mag. Nat. Hist. (Charlesworth's), Vol. I, 1837, p. 585, *partim*, nec *Arvicola indica*, Gray; *id.* List of Mamm. B. M. 1843, *partim*; Kelaart, Prod. Faun. Zeyl. 1832, p. 66.

Mus (Neotoma) providens, Elliot, Mad. Jour. Lit. &c., Vol. X, 1839, p. 209, *partim*, nec *Mus indicus*, Geoff. St. Hil., nec *Arvicola indica*, Gray.

Mus (Nesokia) indicus, Blyth, Cat. Mamm. As. Soc. Mus., 1863, p. 112, *partim*, nec *Arvicola indica*, Gray, nec *M. huttoni*.

Nesokia indica, Blyth, Journ. As. Soc. Bengal, Vol. XXXII, 1863, p. 329, *partim*, nec *M. hardwickii*, nec *Mus indicus*, Geoff., St. Hil.; Jerdon Mammal of Ind. 1867, *partim*.

Mus hardwickii, Kelaart, Prod. Faun. Zeylanicæ, 1852, p. 65.

The head short and truncated, with a deep muzzle; the ears nearly round, the height equalling the distance between the tip of the muzzle and the eye, nearly nude, but sparsely covered with minute hairs. Eye moderately large, occupying about the middle of the interval between the tip of the snout and the ear. Feet well developed. Claws short and stout. The

tail nearly equals the length of the trunk and head, and is thus longer than in *M. (N.) blythianus*, seminude, ringed and with short brown bristly hairs around the margin of the annuli. Whiskers full and long.

The fur is rather harsh and long and consists as in the other species of three kinds, but the long piles are not numerous.

The general colour of the upper parts is brown, paler than in *M. (N.) blythianus*, with an intermixture of yellowish or fawn-coloured hairs as in that species, producing a varied hue of brown and yellow: the under parts are whitish with a yellowish tinge, and there are no brown or long hairs intermixed. There is a variety occurring in the red soil and which Elliot says is much redder* in colour than the common *Koku* of the dark land. The nose, ears and feet are dark flesh-coloured or brownish, and the feet are covered with short brown hairs. The claws are yellowish. The whiskers are black.

Sir Walter Elliot gives the following measurements of an old male: length of body 7 inches; of tail $6\frac{1}{2}$; total $13\frac{1}{2}$; of head $1\frac{1}{16}$; of ear $\frac{2}{5}$; of fore palm $\frac{1}{4}$; of hind palm $1\frac{1}{4}$; weight 6 oz. 5 drs "†

The skull is considerably smaller than that of *M. (N.) blythianus*, of the same age, from which it is also distinguished by its more outwardly arched malar process of the maxillary; by its considerably smaller teeth, and long, but less open, anterior palatine foramina. The brain case also is relatively shorter and more globular than that of *M. (N.) blythianus*. The total lengths of two female skulls of the same age of these species stand in the following relations to each other. *M. (N.) providens*, 1"·45. *M. (N.) blythianus*, 1"·67. Molar line in the former 0"·30, in the latter 0"·33. The upper surface of the skull in the fronto-nasal region is less arched in *M. (N.) providens*, than in *M. (N.) blythianus*. The incisors are brilliant orange, more so than in *M. (N.) blythianus*, but this is a variable character.

The external features which distinguish this from the nearly allied *M. (N.) blythianus* are its smaller size and slightly shorter head and muzzle, and somewhat smaller ears and longer tail, associated with a paler brown fur and fewer long piles.

This animal occurs in southern Western India and also in Ceylon. In the Indian Museum, there is one of Kelaart's specimens of *Mus dubius*, and which he afterwards considered to be *Nesokia hardwickii*, but its skull and features generally are those of this species.

This species produces from 8 to 10† at a birth. Elliot relates that this burrowing field-rat is largely eaten by the Wuddurs, or tank-diggers, who also

* It is a curious circumstance that the pelage of *M. (N.) blythianus*, becomes quite rufous in alcohol, and that stuffed specimens long exposed to light, change to the same hue, as do also stuffed examples of *M. (N.) providens*.

† *l. c.*, p. 210.

‡ *l. c.*, p. 210.

plunder its burrows for the grain that is stored up for its winter consumption, and he mentions that in favourable localities the Wuddurs find the grain in such quantities as to subsist almost entirely upon it, during that season of the year! Sir Walter Elliot has also described the burrows of this species, which apparently closely correspond to those of *M. (N.) blythianus*, and he states that a variety is said to frequent the banks of nullahs and to take to the water when pursued, but that these differ in no respect from the common kind—an exact parallel to what occurs also with the allied form *M. (N.) blythianus* found in Bengal.

MUS (NESOKIA) BLYTHIANUS, n. s.

? *Arvicola bengalensis*, Gray and Hardw., Ill. Ind. Zool., Vol. II, 1833-34, pl. 21, not described.

Mus (Nesokia) indicus, Blyth, Cat. Mamm. As. Soc. Mus, 1863, p. 112 *partim*, nec *M. indicus*, Geoffroy St. Hil.

Nesokia indica, Blyth, Journ. As. Soc. Beng., Vol. XXXII, 1863, p. 329, *partim*, nec *Mus indicus*, Geoffroy St. Hil.; Jerdon, Mamm. Ind. 1867 p. 187, *partim*, nec *M. indicus*, Geoffroy St. Hil.

Head moderately large, but the muzzle broad and deep compared with *Mus decumanus*. Ears rounded; about one half the length of the interval between their base anteriorly and the tip of the snout nearly nude, but sparsely covered with minute hairs. Eye moderately large, placed a little nearer the ear than towards the tip of the snout. Feet well developed, moderately large. Claws short and stout. The length of the tail somewhat variable, but rarely exceeding the length of the trunk, exclusive of the head. It is ringed and sparsely covered with short bristly hairs at the margins of the rings.

The fur is rather coarse and the piles are profusely intermixed among the pelage and project a long way beyond it. These long hairs are most numerous on the lumbar and sacral regions.

The general colour of the animal is dark brown with fleshy-coloured nose, ears and feet, the under-surface having a somewhat greyish tint approaching to hoary. Intermixed among the generally brown hairs of the upper parts, are numerous yellowish hairs producing a speckled appearance, and these yellow hairs give rise to a somewhat rufous tint in the brown colour. The under-surface is without any intermixture of brown and yellow hairs. The ears and upper surface of the feet and the tail are clad with short brown hairs. The whiskers are black.

Measurements in the flesh, of male and female.

	♂	♀
Length of body and head,.....	8".20	6".05
" " tail,	6".45	5".55
Total length,	14".65	11".60
Length of hind foot,	1".30	1".30
Height of ear,.....	0".83	0".75
Breadth of ear,	0".75	0".65

The females are distinguished by the presence of 8 pairs of mammary teats. Two in the inguinal region, four on the sides, one pair in the axilla and one pectoral pair.

The skull is distinguished from the skull of the nearly allied form *M. (N.) providens* by the characters already stated, and from the skull of *M. hardwickii* it differs in its considerably narrower incisors and smaller and more irregularly laminated molars, and by its long and open anterior palatine foramina. It is also a more arched skull. The incisor teeth are orange, occasionally brilliantly so, but generally white towards their tips, whilst in some these teeth are nearly white in both sexes, but the teeth of the males are usually the most coloured.

The nasals vary considerably in length and breadth. Compared with the skulls of ordinary mice, shortness of muzzle is one of its most distinguishing features, associated with expansion of the zygomata and general rotundity. The skull of the male is always considerably larger than that of the female. Among males found among the native huts, I have observed two types of skull, one larger than the typical form, but the animals in other respects were identical with other males conforming to the ordinary type of skull. I have never observed these more elongated skulls in females, but if they do occur I would be disposed to attribute the variation to inter-breeding with *Mus decumanus*.

The adult rat, in its external appearance, has a strong resemblance to *M. decumanus*, when the depth of its muzzle and longer tail are overlooked, and a superficial observer at first sight would be disposed to regard them as one and the same species.

It is distinguished from *M. (N.) hardwickii*, by its much longer tail, by its coarser and much darker pelage, narrower incisors and larger ears, and these features and its much smaller feet distinguish it from *M. (N.) scullyi*.

It is a larger animal than *M. (N.) providens*, than which it has somewhat larger ears, a larger head, and broader incisors.

The Indian Museum possesses examples of this species from Gházipur in the North-West of India, from Dacca, Cachar and Midnapore, and numerous specimens from Calcutta and its neighbourhood.

In Cachar specimens, the colour is somewhat darker.

This rat is very generally distributed over Lower Bengal, and from its abundance it becomes a nuisance in gardens, owing to the tortuous character of its burrows, and from the circumstance that they are generally only a few inches below ground, unless the animal happens to burrow on the bank of a tank when the burrow usually runs horizontally inwards. A burrow consists of a great number of short passages which run a short way and then stop, but I have been unable to detect that they are generally constructed on one plan. There is, of course, a continuous but tortuous principal passage from which the offshoots are given off, and the termination of the former, or it may be the end of one of the short passages, may be enlarged and contain a nest of leaves and grass. Other burrows are much simpler, consisting of only a few passages with one principal passage running right inwards for a long way, and these are generally constructed on the banks of tanks. From a nest such as that described I have removed as many as 10 young rats. Like *M. (N.) providens*, it is of a fierce disposition and utters a peculiar aspirant sound, grinding and rather knocking its teeth together at the same time, and erecting all its fur, more especially the long piles, and contracting its ears which, like the ears of rats generally, are capable of a folded contraction, about the middle of the conch.

I have already mentioned its aquatic habit and that of storing grain.

The Indian Museum, some years ago, received from Moulmein, through the late Captain Hood, a nearly albino adolescent female *Nesokia* closely allied to this species and to *M. (N.) providens*, but as it is immature, and abnormal in colour, I hesitate to name it specifically. The following are its measurements:

Length of body and head,	6"·70
„ of tail,	5"·26
Total length,	11"·96
Length of hind foot,.....	1"·32
Height of ear,	0"·75

The skull has the ordinary characters of this section of the Sub-genus, and manifests some affinities to *M. (N.) providens*, more especially in its anterior palatine foramina, which are narrower than in *M. (N.) blythianus*.

Hodgson has described a rat which is closely allied to this species, viz., *M. (N.) plurimammis*.

MUS (NESOKIA) BARCLAYANUS, n. s.

Dr. Arthur Barclay of the Bengal Medical Service, obtained at Gúna, Central India, an adult male field rat which appeared at first sight to be a new generic type, judging from its external appearance only. Whilst it had the general form of *Nesokia* there was this remarkable feature that its ears

were nude and only projecting a very short way above the fur, while a broad white band ran from above the nose, through the eye, to the ear. I had the animal figured and afterwards killed, and on examining the skull there could be no doubt regarding the animal's affinities, and that it was closely allied to *Mus (Nesokia) blythianus*, having the same narrow incisors, compared with *M. (N.) hardwickii*, and the same small molars, with wide anterior palatine foramina.

The ears were nearly symmetrical on either side and, as already stated projected only a little above the fur. It seemed to me, however, that their short character was due to their having been artificially cut, as the margin of each ear was rounded and unhaired. I was therefore disposed to conclude that this rat must have been once in confinement, probably on account of the curious sport of a white band from the nose through the eye, and that either to mark the animal so that it could always be recognised, or perhaps with the object of enhancing its value to the uninitiated, its ears had been cut. There could be no doubt but that it was a *Nesokia* allied to, but probably distinct from, *Mus (N.) blythianus*.

I was so convinced of this that I sent to the North-West for more specimens of these field rats, and to Mr. Whitwell of the Opium Department, Gházipur, I am indebted for a female field rat which appears to be a normal example of a species which was first made known by the sport which I have described.

The following is a description of this species :

Muzzle short and bluff, less so than in *M. (N.) hardwickii*, and slightly shorter than in *M. (N.) blythianus*. Ears moderately large and rounded. Forehead slightly arched. Tail exceeding the length of the trunk, but not equalling the length of the combined body and head : ringed and sparsely clad. Hind foot well developed. Piles moderately long. Fur not very soft, much coarser than in *M. (N.) huttoni*. General colour of upper parts brown or brownish, tending to silvery grey on the under surface. Feet and muzzle flesh-coloured ; hair brownish. Tail nearly black. Claws horny white.

-Dimensions of male and female.

	♂	♀
Length of body and head,	8".70	7".75
" of tail,	7".20	7".00
" of hind foot,	1".39	1".33

The skull is considerably larger than that of *Mus (N.) blythianus*, relatively longer and more arched. There is not, however, very great difference in size between the teeth of this form and that of *M. (N.) blythianus*, and the anterior palatine foramina are much the same in both. The nasals are considerably relatively broader and larger than those of *Mus (N.)*

blythianus, but these bones appear to be subject to considerable variation in this group, and, in the female skull, they are much narrower than in the skull of the male.

In Sind, there is a field rat which corresponds in its general character to this species. The skull of a female from Khípra, Thar and Párkar District, Sind, has all the characters of the female from Gházipur with exactly similar nasals.

A very closely allied, if not identical rat to this, is found at Srinagar, Kashmir, and of which the Indian Museum has one example collected by Dr. Stoliczka.

Its skull exactly agrees with the skull of the male (see figure), except that its nasals are a little narrower. This Kashmir rat is a dark sandy brown above, with long black piles, especially on the lower portion of the back; the under surface of the animal being yellowish with an intermixture of dusky. The fur is coarse, resembling that of this species, of which the Kashmir rat is probably a local race.

This rat appears also to occur in the Purneah District, and in the Indian Museum there is a skull of a rat, marked Cachár, seemingly closely allied to this form.

3rd Section

MUS (NESOKIA) ELLIOTANUS, n. s.

Head short and deep; muzzle deep and broad; eye half way between ear and nose, moderately large; ears not large, rounded sparsely covered with short hairs. Feet large and well developed with strong claws and sparsely clad. Tail sparsely covered with short bristles on the margins of the annuli, and nearly equalling the length of the body and head.

Pelage coarse, with moderately long piles, most numerous on the back and over the rump. Vibrissæ moderately long.

General colour above, brown with intermixed yellowish or pale brown hairs, producing much the same colour as in *M. (N.) blythianus*, paler on the sides and passing into greyish on the under parts. Nose and feet flesh-coloured. Ears dark brown, tail blackish.

Measurements of 4 specimens.

	Calcutta.	Purneah.	Calcutta.	Purneah.
	♂	♂	♀ juv.	♀ juv.
Length of body and head,...	10".50	9".85	8".25	6".95
„ of tail,	5".80*	9".70	7".40	6".90
„ of hind foot,	2".28	2".28	2".04	1".83
Height of ear,	1".12	1".08	0".95	1".03

The skull of this species approaches in size the dimensions of the skull of such rats as *M. (N.) giganteus*, but in form it resembles the skull of

* Imperfect.

M. (N.) blythianus more than that of the former, being less elongated and with a shorter muzzle, with less breadth between the lachrymal foramina. The teeth have the same characters as in *M. (N.) blythianus*, but, of course, are very much larger. The nasals are moderately short and very different from the broad nasals of *M. (N.) giganteus*.

The total length of the skull of the largest male is 2·20 from the upper border of the foramen magnum to the end of the premaxillaries, with a maximum breadth of 1·27 across the zygomatic.

Mr. S. E. Peal has presented to the Indian Museum from Sibságar, Assam, a rat distinctly referable to this species, and I am indebted to Mr. W. T. Blanford for the opportunity to examine another example of this species from the Khási Hills.

In all of these skulls, the female as well as the male, the incisors are bright orange, but in the female somewhat paler, due to her youth or, it may be, sex, and with white tips as in the male Assam skull.

I obtained this rat first at Purneah and afterwards two specimens at Calcutta. The adult male of these two I obtained from a native who asserted that he found it in a palm tree, which I discredit. It is evidently a burrowing rat closely allied to *M. (N.) blythianus*. It would appear to be very rare about Calcutta, for I have not succeeded in obtaining more than two specimens, notwithstanding that I have made special efforts to obtain others. In all probability, the rats mentioned by Hardwicke as Calcutta bandicoots were large examples of *Mus decumanus*, which occasionally attains to a great size.

Blyth, in his Memoir on the Rats and Mice of India, remarked that *Nesokia indica* (= *Mus blythianus*) had not been seen from the eastward of the Bay of Bengal, though it was likely enough to occur in the dry climate of the region of the Upper Irawadi. Mr. Theobald in 1866*, in confirmation of this supposition of Blyth's, recorded the occurrence at Tonghoo, on the Sittang, of a rat which he referred to this sub-genus. The dimensions indicate an animal of about the same size as *M. (N.) elliotanus*, but distinguished from it at once by the different proportions of its tail and trunk. It is in all probability a new species.

MUS (NESOKIA) GIGANTEUS.

Mus giganteus, Hardwicke, Trans. Journ. Linn. Soc., Vol. VII, 1804, p. 306, Pl. 18; Desm. Mamm. 1822, p. 298; Brantz, Muizen, 1827, p. 101; Gray, Proc. Zoo. Soc. 1832, p. 40; Kelaart, Faunæ Zeylanicæ, 1852, p. 58.

Mus (Neotoma) giganteus, Elliot, Madr. Journ. Lit. and Sc., Vol. X, 1839, p. 209.

* Proc. As. Soc. Beng. p. 239.



Mus bandicota, Blyth, Cat. Mamm. As. Soc. Mus., 1863, p. 112; *id.* Journ. As. Soc. Bengal, Vol. XXXII, 1863, p. 333.

Pandi Koku, Telegu = Pig-rat, according to Elliot, *l. c.*, p. 209.

Nose somewhat pointed; muzzle moderately long and rather deep; eye considerably nearer to the ear than to the nose, moderately large. Ears somewhat large and rounded, nearly nude, but sparsely clad with short brown hairs. Tail broadly ringed, sparsely clad with short hairs and nearly equaling the length of the body and head. Feet well developed, sparsely clad on their upper surfaces with short hairs; claws not strong. Vibrissæ long, some of those of the moustache passing behind the ear.

Pelage coarse, consisting of three kinds of hairs, *viz.*, the underlying fur, the bristly hairs of the general pelage and the long coarse piles which are intermixed in great profusion among the fur of the back. These long piles are especially abundant on the lumbar and dorsal regions where they are very long, and being so numerous hide the general pelage lying below them and project out a long way beyond it. The piles are almost entirely absent from the sides of the animal and from the head and neck, but, beyond the latter region they rapidly increase in numbers and length. In the living animal, these piles are always as a rule erect.

The general colour of the animal is earthy brown with intermixed yellow hairs, paler on the sides, where the yellowish or grey hairs are more numerous, owing to the absence of the piles. The piles are so numerous on the back that that region is uniform dark brown, and this colour is prolonged along the back to the head. The under surface is dusky brown with a greyish tint. The limbs are brownish, and the nose, inside of the ear and the feet are flesh-coloured, the upper surface of the latter being sparsely covered with dark brown hairs. The tail is black.

This animal attains to a great size; the type having measured 13.25 inches in the length of its body and head, with a tail 13 inches long; but adult males are even larger than this.

The skull of this rat is much more elongated than the skull of *M. (N.) providens*, but it, as already stated, belongs to the same group, but is, of course, immensely larger, measuring 2".66 in length by 1".35 in maximum breadth across the zygomatic. It differs from the skull of the allied species from Lower Bengal and Assam in its slightly more elongated muzzle and very much larger nasals. The female has 12 mammae.

This species occurs in great numbers in the district around Gúna and, like its congener *M. (N.) blythianus*, it has the reputation of being a water rat. In the Manbhúm District it is not uncommon, but two specimens in the Indian Museum are much greyer than those from Bhádrachellum, south of the Godávari, presented by Mr. W. T. Blanford, and which

nearly resemble the bandicoot of Ceylon. The Manbhúm rats have many greyish piles interspersed among the dark brown hairs, but this seems to be only a local variation of no importance. Their skulls agree with the skulls of the bandicoots from Gúna, for which I am indebted to Dr. A. Barclay, and are not separable specifically from them. Although these Gúna rats and also the bandicoots from the south of the Godávári are the exact counterparts in external appearance of the Ceylon rats, the skulls of the latter have remarkably different nasals from the rats of Gúna and Manbhúm, being much narrower and more posteriorly pointed, and moreover the muzzle of the skull is narrower and not so long. Allowance, however, must be made for variation, especially in insular examples of a species, and I am, therefore, disposed to regard the foregoing differences observable in the species of the Ceylon bandicoots in this light.

Description of Plates.

Plate XIII, *Mus (N.) blythianus* : *a*, upper view of skull of a ♂ ; nat. size : *b*, under view of same skull : *c*, side view of same skull : *d*, teeth of right upper jaw and teeth of right lower jaw, enlarged

Mus (N.) providens : *e*, upper view of skull of *M. N. providens*, nat. size : *f*, under view of same skull : *g*, side view of same skull : *h*, teeth of right upper and lower jaws, enlarged.

Mus (N.) barclayanus : *i*, upper view of skull : *j*, under view of skull : *k*, side view of skull : *l*, teeth of right upper and lower jaws, enlarged.

Plate XIV, *Mus (N.) giganteus* : *a*, upper view of skull : *b*, under view of skull : *c*, side view of skull : *d*, 1, teeth of right upper jaw, enlarged : *d*, 2, teeth of right lower jaw, enlarged.

Mus (N.) elliotanus : *e*, upper view of skull : *f*, under view of skull : *g*, side view of skull : *h*, right upper and lower teeth, enlarged.



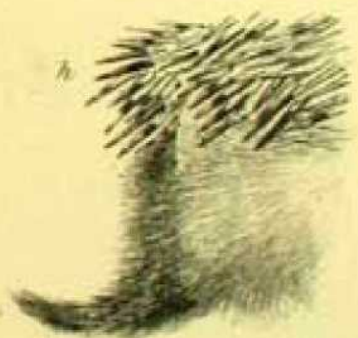
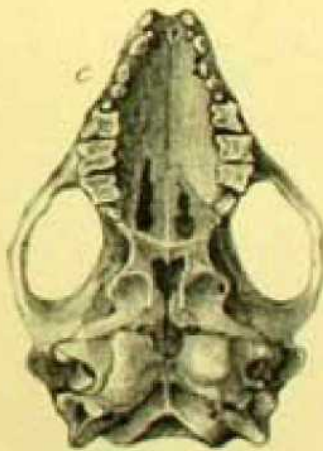
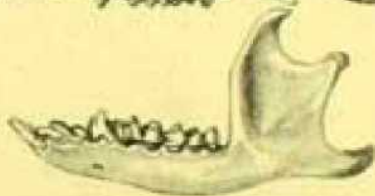
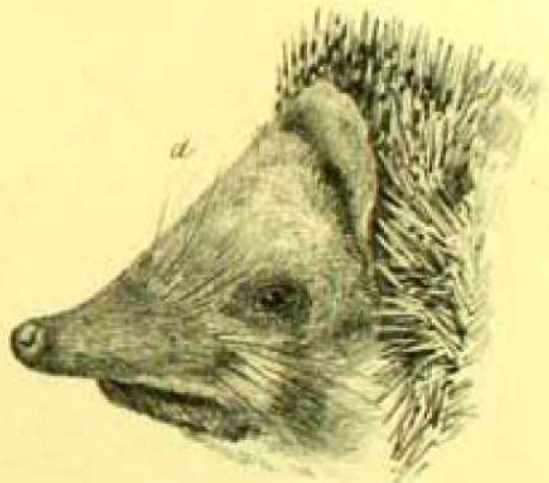
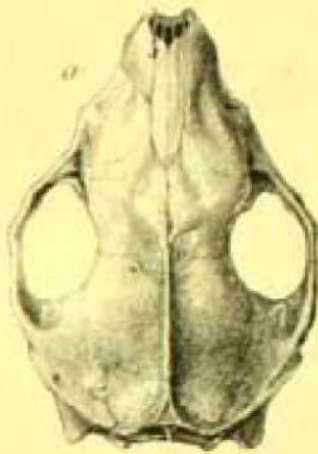
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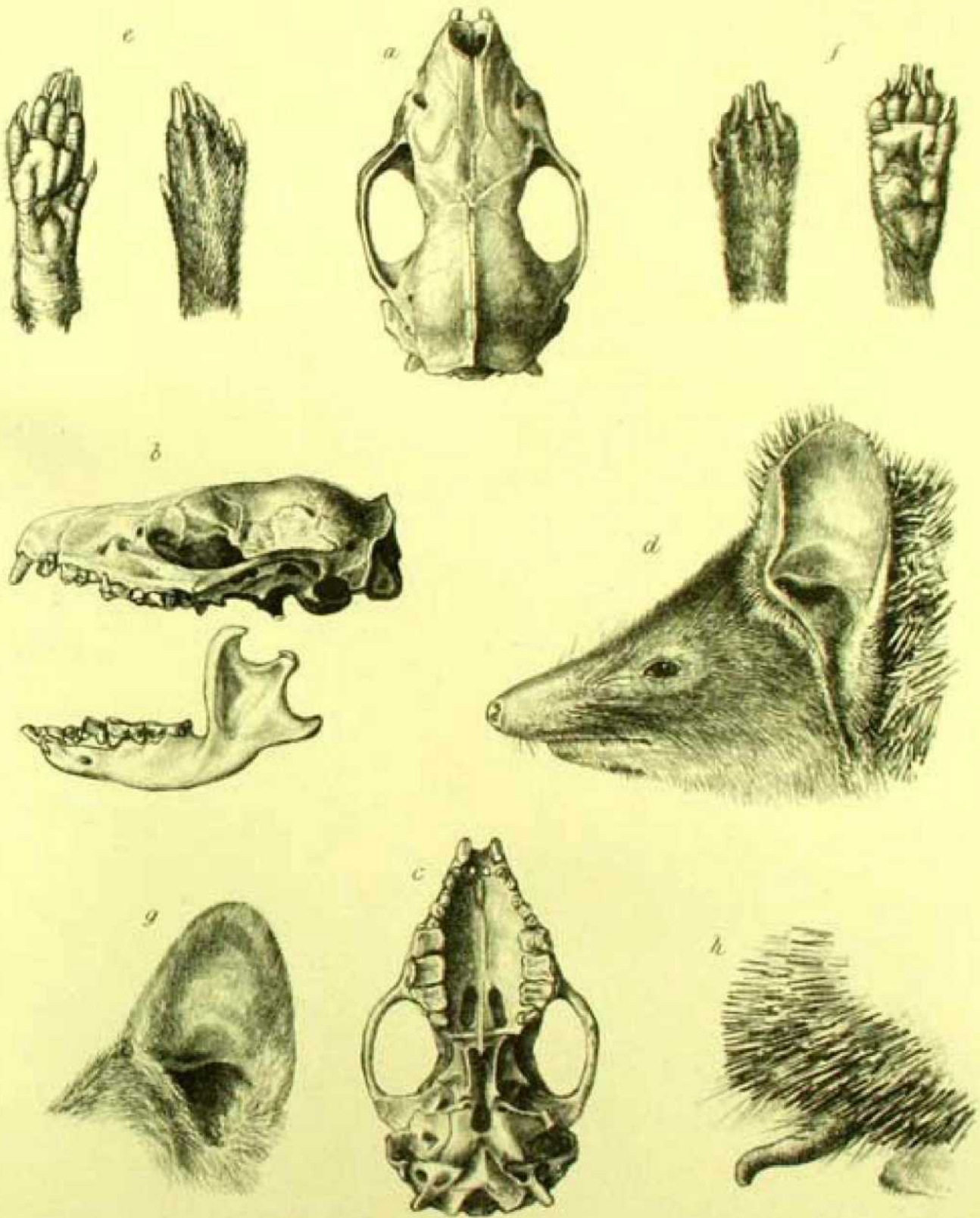
Names of new genera and species have an asterisk (*) prefixed.

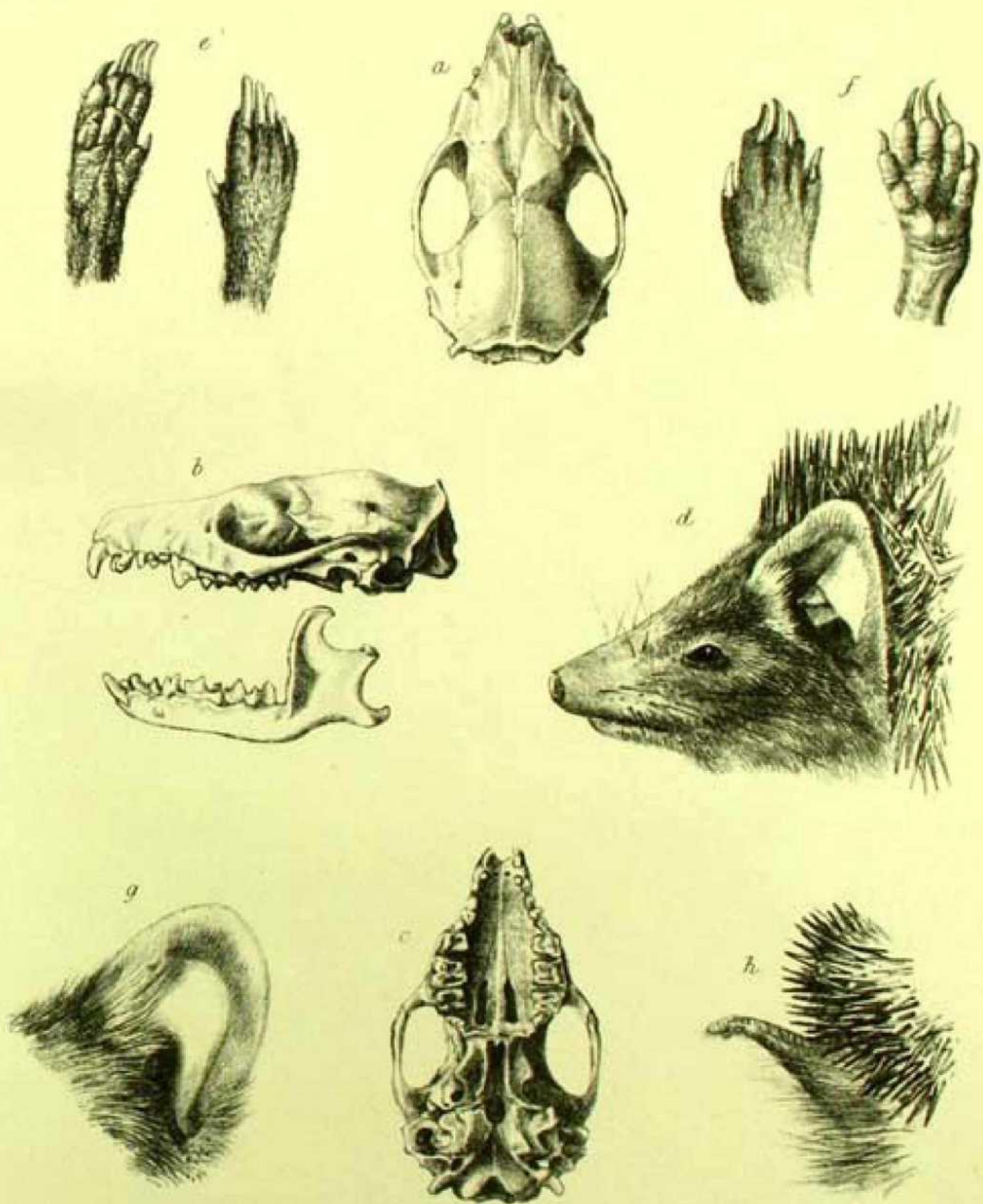
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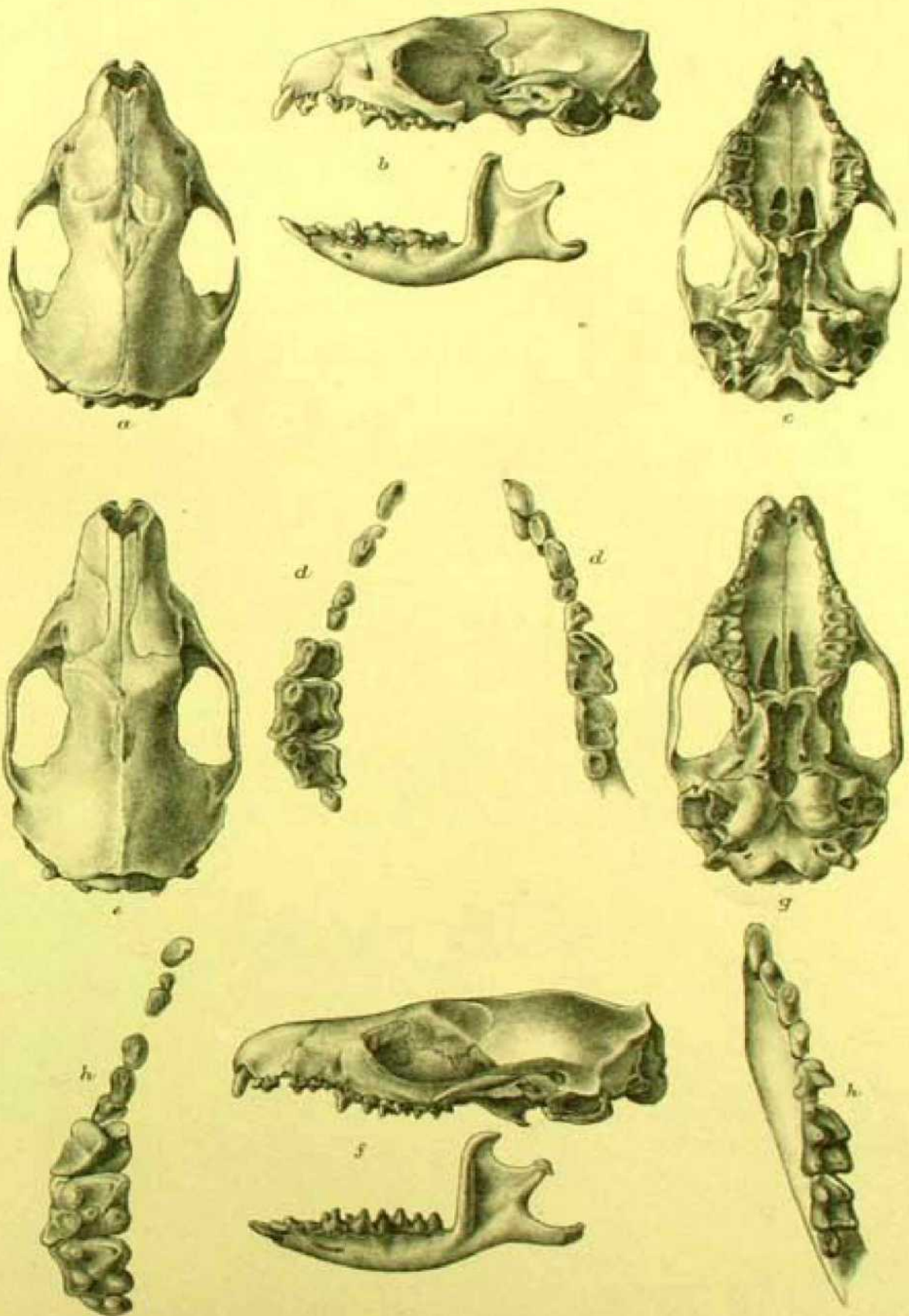
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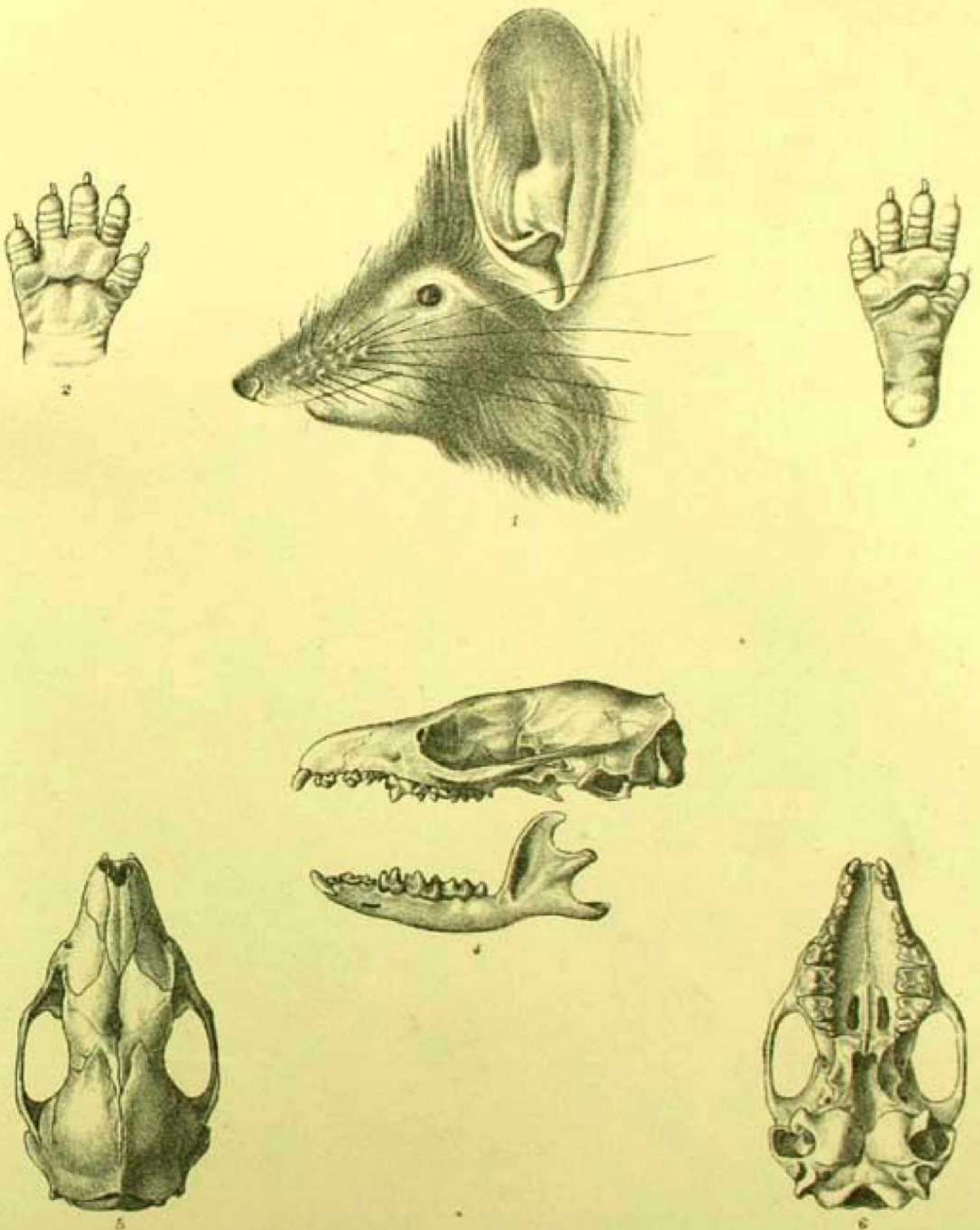
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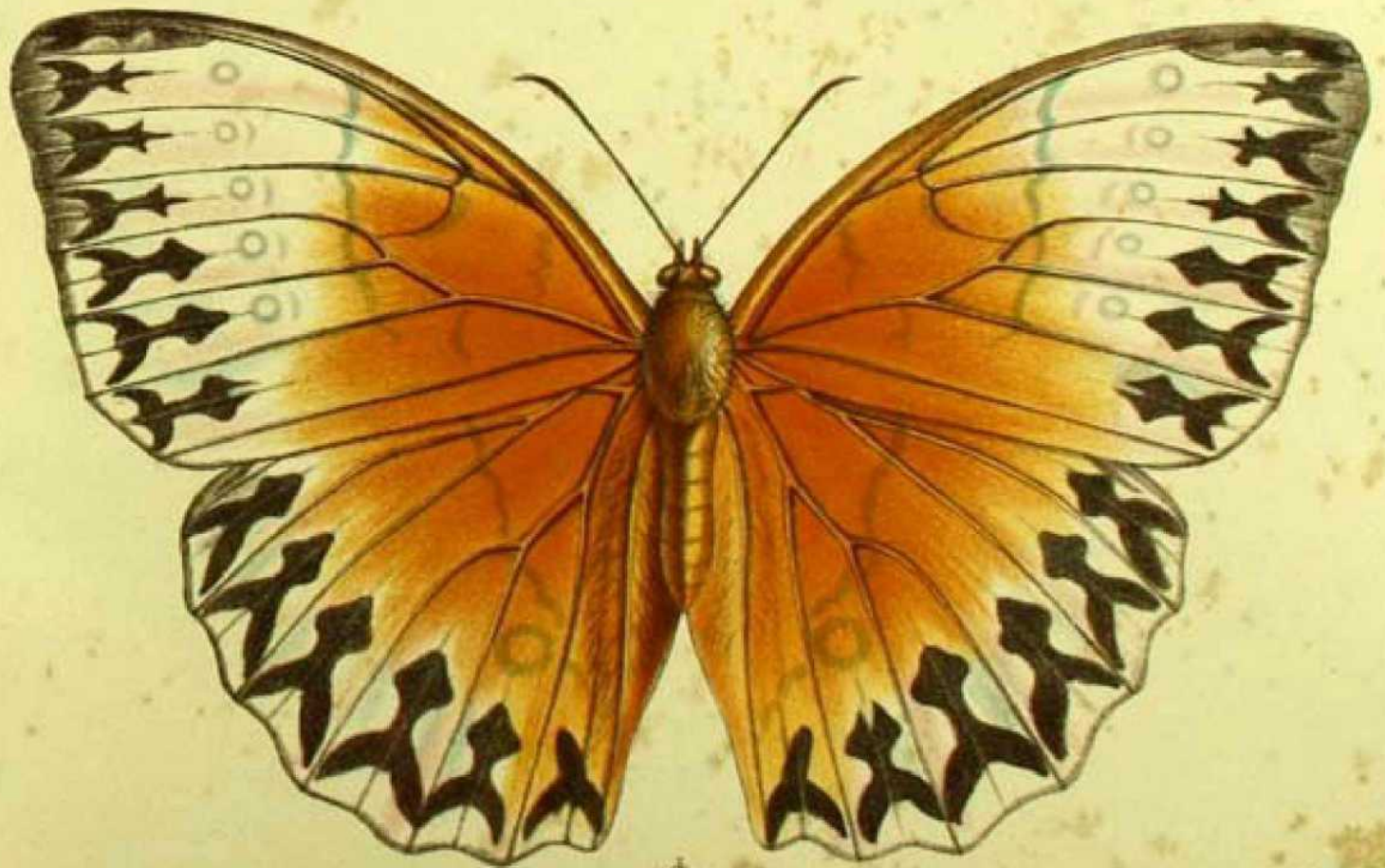
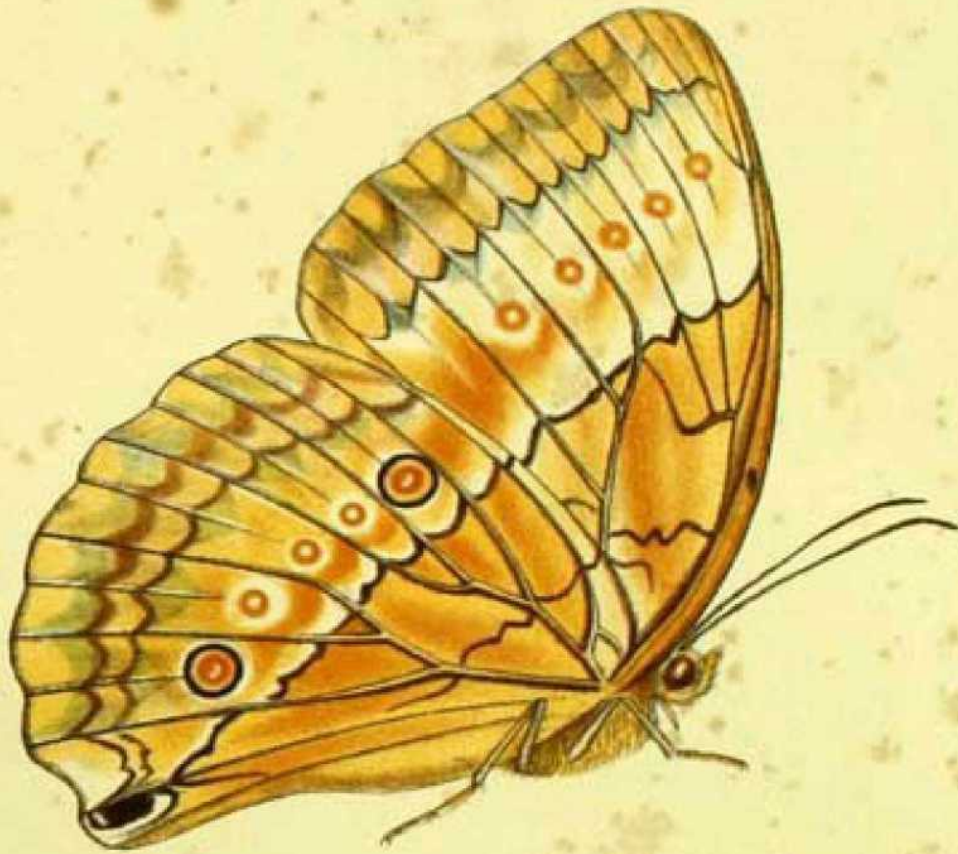








ERINACEUS NIGER.



W

THAUMANTIS LOUISA

Mintern Bro^s imp.

